

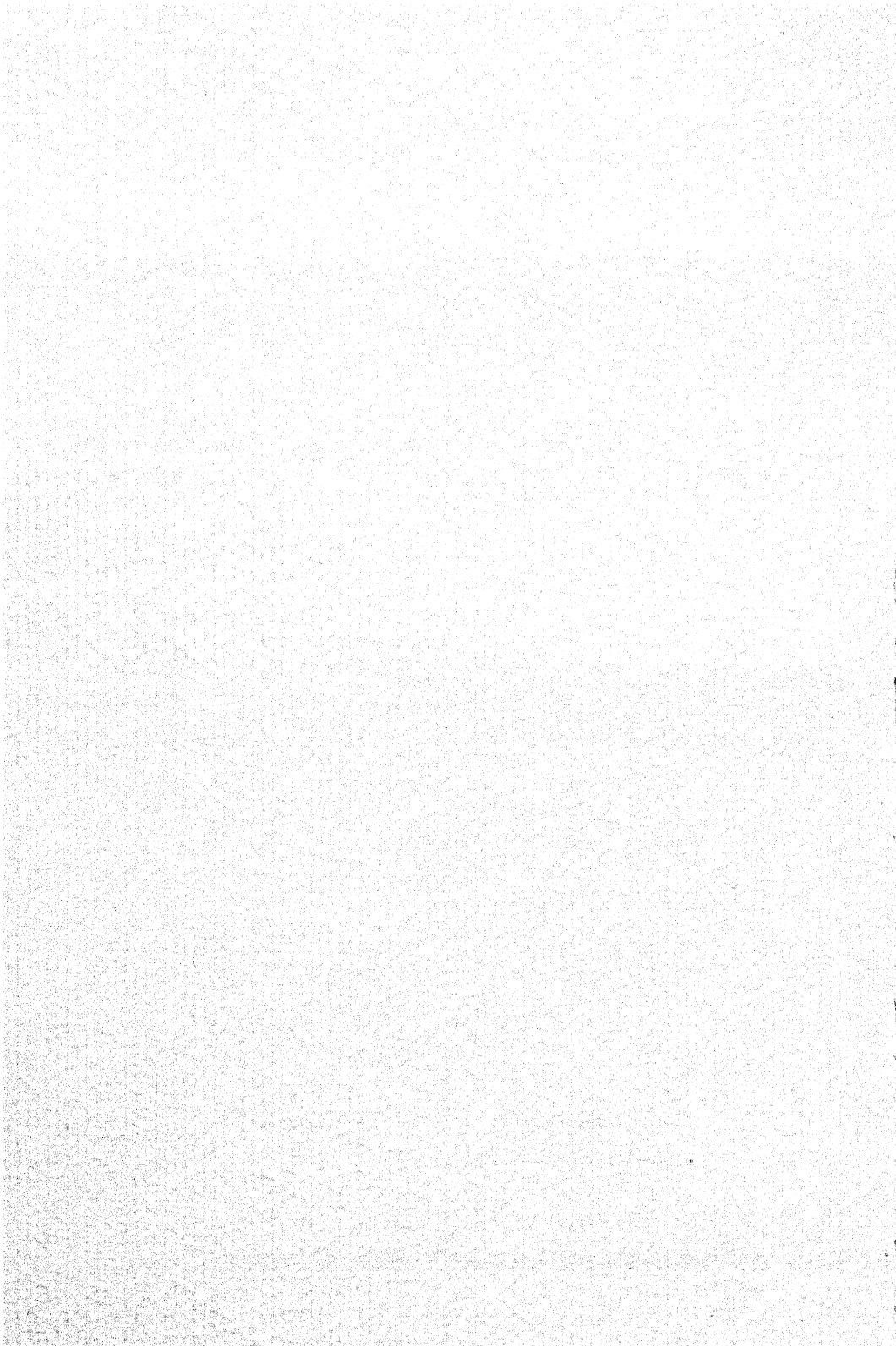
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TABULAR KEYS

FOR THE

IDENTIFICATION

OF THE

WOODY PLANTS



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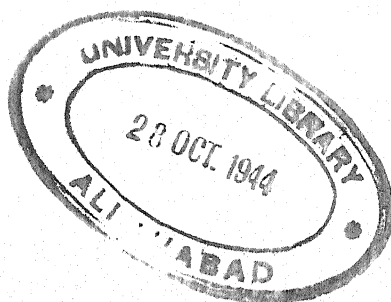
This set of TABULAR KEYS has been evolved for the use of students and others interested in the more used woody plants of the Northern States and Canada—for study and for identification in the field.

It cannot take the place of those more detailed and complete references already available nor is it so intended. It is rather designed for quick reference and comparison and for use in the field. The attempt has been made to eliminate as far as possible the use of instruments such as scalpel and microscope and to lead the student to observe and to identify from external characters.

The Keys include the five hundred trees, shrubs, vines, conifers, and broad-leaved evergreens heretofore described in the card file entitled "USEFUL TREES AND SHRUBS." These Keys supplement and complete that work. But the two can be used separately if desired. Every attempt has been made to verify the characters used and to check them against the work of standard authors. With a few exceptions, the nomenclature follows that of the last edition of the Manual by Alfred Rehder. In the interest of simplicity we have retained one or two names which much usage has seemed to justify and we have preferred to follow recent precedent in discarding the capitalization of species names and the double i ending. Changes from the card file can be noted in the list of names preceding the text.

In offering this set we trust it will prove helpful to students and useful to others.

FLORENCE BELL ROBINSON



How To Use the Keys

Keys to the *genera* are similar in type to the keys found in all standard works on Botany, but differ from the other keys in the attempt to eliminate the use of scalpel and microscope, also in the addition of a key based on winter buds and twigs. These genera keys are adapted from those arranged by Dr. Trelease and published in "The Native and Naturalized Trees of Illinois." We are indebted to Dr. Trelease and Dr. Telon for their permission to do this. Data incorporated in the keys has been checked against the works of the following authorities—Gray, Rehder, Bailey, Trelease, as well as in the field. In only a very few instances have we taken the liberty to disagree with any of these authorities.

In using the keys, read all statements labelled A, AA, AAA and decide which one best fits the tree or shrub you are considering. If it belongs under A, then you have eliminated all under AA and AAA and need consider those no further. Similarly for AA or for AAA.

Below A is b and the latter is used twice, i. e. b and bb. Again decide which of the two fits the tree or shrub and then proceed to the next pair of statements, labelled c and cc. Continue this until the last statement leads to the name of a genus. For every positive statement there is a negative—a tree *is* or *is not* of a certain type, it *has* or *has not* a certain character. With that fixed in mind the keys are simple to use and the results you obtain depend only upon the accuracy of your observation and judgment.

Having traced the plant to the name of a genus, turn to the page and genus indicated and check the twig or leaf against the identification characters there stated for winter and for summer. If it fails to check at this point you have made an error and will need to begin over. But if you have been accurate, it will check. It sometimes occurs that one is not certain of some character to be observed, in which case it is necessary to proceed by the process of elimination. Assume the first statement and carry through. If it does not check at the end, go back and try the opposed statement and proceed until you get a positive check.

Continue the identification by means of the *tabular keys to the species*. Begin at column one—again you find a positive and a negative statement, both in column one. If the first statement fits, do not go below the line of the second. If the second statement fits better than the first, then skip everything above that statement. The full identification depends upon a combination of characters, as is clearly shown in this tabular key, and not upon any one characteristic alone. Follow each column through in turn, and decide upon the character that fits in each case. Having decided upon a character, you do not need to consider anything above that line in successive columns. When you have finished, the species of your leaf or twig will check horizontally across the page. The heavy dotted lines assist in tracing down the decisive differences between species. These are drawn solely for the purpose of clarity and have no other significance.

The heavy full lines and doubled lines assist in reading the keys rapidly. Heavy lines divide the species into smaller groups having similar characteristics, and the dotted lines call attention to certain important points of distinction between adjacent species.

Keys for trees, shrubs, vines, conifers, and broad-leaved evergreens are separated. Since each type of plant is thus considered separately it is necessary to decide first of all to which type the plant belongs. If not sure of this, the process of elimination can be used, trying each type in turn until you get a positive check on characteristics.

KEY TO THE TREES WHEN IN LEAF

- A. Leaves persistent, simple, entire, resinous-dotted Myrica
- A. Leaves deciduous in autumn; with a broad blade, not needle-like
 - a. alternate (one leaf at a node)
 - fruit a cone; buds solitary, stalked, with 3 scales which meet at the edges Alnus
 - fruit not a cone; buds not as above
 - b. leaves simple
 - leaves parallel-veined, appearing fan-like Ginkgo
 - leaves with a midrib, net-veined
 - leaves clothed with silvery or brownish scales Elaeagnus
 - leaves without scales
 - c. margin entire, neither toothed nor lobed
 - sap milky, twigs spiny Maclura
 - sap not milky, twigs not spiny
 - leaf broad as long, heart-shaped Cercis
 - leaf longer than broad
 - with a narrow scar completely encircling the twig at nodes Magnolia
 - without such scar
 - leaf widest above middle and with veins anastomosing Asimina
 - leaf widest at or below middle or occasionally above middle but with veins not anastomosing, scarcely visible; leaf leathery.
 - Underside finely hairy Quercus
 - Not hairy below
 - twigs very slender Celtis
 - twigs moderately stout
 - pith with diaphragms; leaf obovate, leathery, veins scarcely visible Nyssa
 - pith without diaphragms; leaf oblong Diospyros
 - cc. leaf margin toothed
 - d. with several strong veins from the base.
 - e. about as broad as long
 - lobed Kalopanax
 - not lobed Tilia
 - ee. longer than broad Celtis
 - dd. with only one strong vein from the base
 - twigs rather spiny
 - leaves folded in the bud; fruit apple-like Malus
 - leaves rolled in bud; fruit pearlike; with many short spurlike branches Pyrus
 - armed with long, sharp thorns; buds stout, red, with fleshy scales Crataegus
 - not spiny nor armed with thorns
 - e. margin singly toothed
 - f. teeth coarse, or if small then widely spaced.
 - leaf base oblique Ulmus
 - leaf base not oblique
 - leaf about broad as long Populus
 - longer than broad
 - teeth few or margin entire Nyssa
 - teeth many
 - buds long, cigar-shaped. Fagus
 - buds short
 - leaves obovate, veins curved, teeth longish Quercus .

- leaves widest at middle;
 - veins quite straight, side
 - veins parallel, teeth short,
 - one at end of each vein . . . Castanea
- ff. teeth fine
 - petiole with small glands Prunus
 - petiole without glands
 - leaves linear or lanceolate . . . Salix
 - leaves broader, ovate-lanceolate to ovate,
 - bark not scaly, looks muscular. Carpinus
 - bark scaly, leaf-base symmetrical
 - g. with stipules
 - stipules persisting, petioles short. . . . Photinia
 - stipules deciduous, petioles longer, slender. Amelanchier
 - gg. without stipules, leaves thin, bark shredding . . . Halesia
- ee. margin doubly toothed
 - base oblique Ulmus
 - base symmetrical
 - bark scaly, peeling in long strips . . Ostrya
 - bark not scaly.
 - bark in layers, often papery . . . Betula
 - bark not in layers, muscular . . . Carpinus
- ccc. leaf lobed
 - h. with several strong veins from the base
 - sap milky Morus
 - sap not milky; leaves broad as long
 - leaves notched at tip Liriodendron
 - leaves palmate, maple-like
 - with a narrow scar around each node; base of petiole enlarged over the bud. . Platanus
 - without such scar, buds unconcealed . . Liquidambar
 - hh. with only one strong vein from the base; variously lobed
 - mucilaginous and aromatic; margin entire. . Sassafras
 - not so; margin toothed
 - pith star-shaped in section; buds with thin overlapping scales Quercus
 - pith round; twigs with long, sharp spines; buds very short, red, with hard, thick scales
 - Crataegus
- bb. leaves compound
 - i. singly odd-pinnate
 - j. with stipules
 - margin serrate
 - leaflets often lobed; hairy, velvety Koelreuteria
 - not lobed, not hairy Sorbus
 - margin entire
 - armed
 - with paired spines at base of leaves Robinia
 - with large simple or branched spines on the stem. Gleditsia
 - unarmed
 - leaflets usually alternate, elliptic to ovate, short acuminate; petiole swelled to cover the bud; branchlets brown Cladrastis
 - leaflets oblong-elliptic, smaller, opposite, acute; branchlets green; buds not concealed . . . Sophora
 - jj. without stipules, unarmed
 - j'. margin serrate
 - with glands at base of leaflets; twigs yellowish, velvety Ailanthus
 - without glands, pith star-shaped in section
 - pith solid; leaves hard, lustrous, or nearly tomentose, and glandular when young . . . Hicoria

- pith chambered, i.e. with cavities; leaves soft, dull Juglans
 - jj' margin almost entire; without glands; bark shredding; fruit a capsule Cedrela
 - ii. leaves doubly pinnately compound
 - armed with large, simple or branched spines on the stem; leaflets small, oval or elliptic Gleditsia
 - unarmed
 - margin entire; leaflets larger, ovate Gymnocladus
 - margin toothed or lobed; leaves hairy Koelreuteria
 - iii. leaves palmately 3-parted Laburnum
- aa. leaves opposite
 - j. simple
 - lobed Acer
 - not lobed
 - k. margin entire
 - leaves broad, net-veined; bark cherry-like Syringa (see shrubs)
 - longer, suborbicular or elliptic to oblong; veins anastomosing; bark not cherry-like Cornus
 - kk. margin crenate-serrate or serrate
 - twigs swollen at the nodes; leaves not lobed Cercidiphyllum
 - twigs not swollen at nodes; leaves occasionally lobed Acer
 - jj. compound
 - leaflets pinnate
 - leaves punctate with pellucid dots; twigs glossy Phellodendron
 - leaves not as above
 - leaflets lobed or at least the lower ones; twigs bloomy Acer
 - leaflets not lobed; twigs not bloomy Fraxinus
 - leaves palmate
 - twigs stout, buds large Aesculus
 - twigs slender, buds small Acer
 - aaa. leaves whorled, i.e. more than two at a node.
 - leaves 3-5 veined at the base; petioles and twigs glabrous Catalpa
 - with one main vein; petioles and twigs rusty pubescent or tomentose Paulownia

KEY TO THE TREES IN WINTER

- a. leaf scars whorled or opposite
 - scars notched at the top; buds superposed; fruit an ovoid capsule Paulownia
 - scars not notched; buds not superposed; fruit a very long, terete pod Catalpa
- aa. leaf scars opposite
 - b. twigs swollen at nodes; buds often developing short spurs. Cercidiphyllum
 - bb. twigs not swollen at nodes
 - twigs covered with silvery or brown scales (appearing in very young growth like the fuzz of a peach); bark fibrous, interwoven Elaeagnus
 - twigs not covered with scales
 - end-bud lacking, twigs forking, bark cherry-like Syringa (see shrubs)
 - end-bud or its scar present
 - end-bud very large ($\frac{1}{2}$ " or more); twigs thick. Aesculus
 - end-bud moderate or small ($\frac{1}{4}$ " or less)
 - c. leaf-scars meeting around the twig
 - scars small, often on raised bases, crescent-shaped; joined by a concave line; bud-scales nearly or quite valvate Cornus

- scars V-shaped, meeting in a convex line, an inverted V or ragged line; bud scales imbricate Acer
- cc. leaf scars not meeting around the twigs; buds sessile
 - leaf scars shield-shaped; buds with 2-4 scales; bundle traces numerous in an ellipse. Fraxinus
 - leaf scars horseshoe shaped, almost meeting around the bud; buds compressed from the sides and silky-brown hairy Phellodendron
- aaa. leaf scars alternate (only one at a node)
 - d. fruit a cone; ordinary leaf scars present; buds moderately large, solitary, stalked, with 3 scales which meet at the edges Alnus
 - dd. fruit not a cone; buds not as above
 - e. buds hemispherical, with many scars clustered about them, developing into short spurs Ginkgo
 - ee. not thus
 - f. leaf scars very large
 - g. twigs thick, end-bud lacking
 - twigs yellowish, velvety; buds solitary, smallish, hairy, located close to scar Allanthus
 - twigs glabrous, glossy, whitened as though with paint; buds minute, superposed, in tiny silky craters removed from the scar Gymnocladus
 - gg. twigs moderately thick, end-bud present
 - buds superposed, hairy, fairly large; pith with cavities; fruit a nut; twigs more or less fluted; bundle traces in 3 groups Juglans
 - buds solitary; twigs terete; bundle-traces 5; fruit a capsule Cedrela
 - ff. leaf scars moderate or small
 - h. twigs green
 - mucilaginous and aromatic; buds small, glabrescent, subglobose with fleshy scales Sassafras
 - not mucilaginous nor aromatic nor with fleshy scales.
 - i. buds silvery, silky-hairy
 - stipules persistent; twigs slender Laburnum
 - stipules not persistent, their scars left; twigs moderate, encircled by a line at the nodes Magnolia
 - ii. buds not silvery, silky-hairy, but woolly, superposed, at first covered by the leaf scar; sometimes thorny Sophora
 - hh. twigs not green
 - j. with a narrow scar encircling the twig at the nodes
 - buds long, slender, pointed (cigar-shaped) Fagus
 - buds not long and pointed
 - terminal buds flattened like a thumbless mitten over the twig-tip, with two valvate scales Liriodendron
 - terminal buds not flattened, with 1 scale only
 - buds hairy; leaf scar U-shaped Magnolia
 - buds not hairy, leaf scar scalloped, encircling the bud Platanus
 - jj. scars not or rarely meeting around the twig.
 - k. with spines or thorns
 - twigs with silvery or brown scales Elaeagnus
 - twigs not scaly
 - l. with thorns or prickles between the nodes
 - prickles short, numerous Kalopanax
 - thorns long, large, often branched; nodes swollen, reddish, looking like an angry sore Gleditsia
 - ll. thorns or prickles at the nodes only
 - thorns stipular, paired Robinia
 - thorns not stipular
 - thorns small, slender, beside the

- bud (lateral); buds with thin scales; sap milky . . . Maclura
 - spines long, stiff, sharp, axillary, becoming twigs; buds with firm, hard, fleshy scales, usually red; sap not milky . . . Crataegus
- kk. without spines or thorns
 - twigs resinous-dotted . . . Myrica
 - twigs not resinous-dotted
 - end-bud naked; buds silky-brown hairy . . . Asimina
 - end-bud with scales, or lacking
 - m. lowest bud scale centered over the leaf scar
 - bud with only 1 scale . . . Salix
 - bud with several scales . . . Populus
 - mm. lowest scales at side of bud
 - bark silvery; twigs with corky ridges; pith star-shaped . . . Liquidambar
- not thus
 - n. buds superposed
 - pith solid, crossed by diaphragms . . . Nyssa
 - pith not solid or not crossed by diaphragms
 - leaf scar C-shaped, almost encircling the buds; buds brown-silky in aggregates resembling single buds . . . Cladrastis
 - leaf scar more narrow; bark of twigs scurfy, rubbing off in fine, hairlike threads; buds with 4 fleshy red scales . . . Halesia
 - bark not scurfy
 - buds rather large; scars with numerous bundle traces in 3-4 groups; pith solid . . . Hickoria
 - buds smaller; bundle traces 3
 - twigs almost black or with a reddish cast; scars fringed at the top; flower-buds between the nodes . . . Cercis
 - twigs lighter; pith solid and crossed by diaphragms . . . Nyssa
 - nn. buds solitary
 - buds $\frac{1}{2}$ -ellipsoid, directed almost at right angles to the twig and with 2 exposed scales . . . Koeleria
 - buds not as above, spreading
 - o. buds red, or green tinged red.
 - buds long, slender, with twisted scales . . . Amelanchier
 - buds short, stout, with

fleshy scales Tilia
 oo. buds not or very slightly red
 p. bud scales keeled
 scales mucronate; twigs slender,
 not spinescent . . . Photinia
 scales not mucronate; twigs mod-
 erate, spinescent . . .
 scales pubescent and margined . Malus
 scales glabrous, not margined . . . Pyrus
 pp. bud scales not keeled nor mucronate
 q. buds in two rows (2-ranked)
 without stipule scars; buds a
 little flattened Diospyros
 with stipule scars
 with 2 or 3 scales; bud not
 flattened; pith 3-sided,
 continuous, green Betula

 with more than 3 scales
 r. bud scales in 2 rows,
 bark scaly
 scales not striate . . . Ulmus
 scales striate Ostrya
 rr. bud scales in 4 rows; bark
 muscular Carpinus
 qq. buds not in 2 rows
 s. twigs more or less fluted,
 moderate
 end-bud solitary or lacking;
 bundle traces 3 . . . Castanea
 end-bud multiple; bundle
 traces numerous, more
 than 3 Quercus
 ss. twigs rounded
 buds elongated, end-bud
 rather large and covered
 with long, white hairs
 emerging from inner
 scales Sorbus
 buds all smaller; often
 collaterally multiple
 buds fat, sap milky . . . Morus
 buds slender, sap not milky
 twigs with a bitter
 almond flavor . . . Prunus
 twigs not flavored
 buds very small, closely
 appressed; bark
 with corky warts
 or ridges Celtis

The Genus ACER is distinguished in

SUMMER : by the opposite arrangement with the leaf scars meeting in a point; the leaves thin, generally lobed, palmately veined; the fruit a paired samara.

WINTER : by the opposite arrangement, with the leaf scars meeting in a point and ciliate at the top; twigs rather slender; buds sessile, of moderate size, with imbricate scales.

| Species | leaves | leaf form | lobe tips | leaf edge | under side of leaves | flowers | veination sap | sinus | leaf shape |
|----------------|----------|------------------|--------------------------------------|----------------------------|--------------------------|--------------------------|--------------------|-------------------|-------------------|
| negundo | compound | leaflets lobed | | doubly serrate | | | | | |
| tataricum | simple | not lobed | | serrate | pubescent | | | | |
| campestre | " | 3-lobed | obtusely taper-pointed | entire doubly serrate | light green white-downy | corymbs erect panicles | milky | | |
| spicatum | " | " | " | " | glabrous | pendulous | | | |
| ginnala | " | " | " central lobe long | " | | | | | |
| pennsylvanicum | " | " | pointed | serrulate | brown-villous first | racemes pendulous | | | |
| pseudoplatanus | " | 5-lobed | acute | fully serrate | green | pendulous | impressed | | |
| saccharinum* | " | " | acuminate | deeply serrate | white-glaucous | panicles lateral corymbs | not milky | deep oval | |
| rubrum | " | " | acute or acuminate | crenate-serrate | " | | impressed | milky broad angle | |
| palmatum | " | deeply 5-7 lobed | acuminate | full doubly serrate | glabrous, bright gr. | few-fl'd corymbs | | | |
| platanoides | " | " | finely pointed | coarsely serrate | glabrous, lustrous | corymbose leafy | bearded in axils | milky | broader than long |
| saccharum | " | " | 3-pointed | dentate | glabrous | pendulous | not milky | longer than broad | |
| nigrum | " | " | central point with blunted shoulders | few coarse teeth | pale soft-pubescent | corymbs | " | | |
| circinatum | " | 7 or more lobes | acute | irregularly doubly serrate | becoming glabrous | corymbs, petals white | all parts glabrous | shallow | |
| palmatum | " | " | acuminate | " | glabrous | purple corymbs | " | deep-cut | |
| japonicum | " | " | " | " | glabrous except on veins | purple corymbs | pubescent | " | |

The Genus ACER is distinguished in

WINTER : by the opposite arrangement with the leaf scars meeting in a point and ciliate at the top;
twigs rather slender; buds sessile, of moderate size, with imbricate scales.

| species | bud
scales | no. scales
exposed | buds | twig color | texture | leaf scars | twigs | bark |
|----------------|---------------|-----------------------|-------------------------------|---------------------------|------------|----------------------------|------------------------|----------------------------|
| spicatum | valvate | one pair | slender,
short | gray | puberulent | | | |
| pennsylvanicum | " | " | large, stout
blunt | green | glabrous | | | |
| palmatum | " | two | short, no
end-bud | brown | glabrous | low and
narrow | never bloomy | green striped
white |
| Japonicum | valvate | more than
two | " | green | " | broad, top
winged | glabrous,
slender | |
| circinatum | valvate | one pair | " | purplish | " | broad, not
winged | glabrous | |
| negundo | " | two | end-bud;
short, fat | glaucous,
green or red | hairy | minute red
glands above | " | |
| rubrum | imbricate | four | multiple,
fascicled | scarlet to
crimson | glabrous | meet in a
point | glabrous,
bloomy | |
| saccharinum* | " | 4-6 | " | red-brown | " | " | crimson
slender | firm |
| platanoides | " | " | large,
flushed red | tinged red | " | " | glabrous,
moderate | lenticellate
gray-brown |
| nigrum | " | more than
six | acute | dull
straw-color | pubescent | " | slender, | dark gray |
| saccharum | " | " | " | dark buff | glabrous | " | dull
slender, | medium
gray |
| pseudoplatanus | " | six | large, acute,
bright green | brown | " | " | polished
moderate, | |
| campestre | " | 6-8 | short, blunt,
ovoid | gray | woolly | " | glabrous,
moderate, | slightly
corky |
| ginnala | " | " | very small,
blunt, ovoid | red-brown | glabrous | " | pubescent
slender, | |
| tataricum | " | " | small, blunt,
ovoid | blackish | " | " | glabrous
slender, | |
| | | | | | | | glabrous, dark | |

Winter Key -- ACER

The genus *AESCULUS* is distinguished in

SUMMER : by the opposite arrangement; large, palmately compound leaves without stipules; flowers long-clawed.

WINTER : by the stout twigs; opposite arrangement; very large buds; and large, low, triangular leaf-scars.

Summer Key

| Species | fruit | bud | leaflets | leaf edge | flowers | habit | petals |
|---------------|--------------------|-----------------|--------------------------------------|-------------------------|-------------------------------------|------------|---|
| glabra | prickly | dry | 5, obovate | serrate | yellowish with long stamens | | eglandular, margin villous; nearly equal; claws longer than calyx |
| carnea | " | sticky at first | 5-7, oblong, subsessile | doubly serrate | salmon pink to scarlet | | glandular, villous on margin |
| hippocastanum | prickly subglobose | sticky | 7, obovate, sessile | obtusely doubly serrate | white spotted red, stamens exserted | tree | 5, claws not longer than calyx |
| octandra | smooth | dry | petioled | finely serrate | yellow, calyx glandular-villous | large tree | petals unequal, calyx glandular-villous |
| pavia | " | " | petiolate, glabrous beneath | serrate | reddish, calyx tubular | small tree | glandular margined |
| parviflora | " | " | 5-7, elliptic gray-pubescent beneath | crenate-serrulate | white, small, stamens long | shrub | 4-5, $\frac{1}{2}$ length of the stamens or less |

Winter Key

| species | buds | habit | bark | bud scales |
|---------------|----------------------|---------------|--------------------|--|
| hippocastanum | sticky | tree | | |
| carnea | sticky, becoming dry | " | | |
| glabra | dry | " | rough, soft, corky | |
| octandra | dry | " | smooth, firm | |
| pavia | dry | tree or shrub | | lowest less than $\frac{1}{2}$ the length of the bud |
| parviflora | dry | shrub | | lowest $\frac{1}{2}$ as long as the bud |

AILANTHUS ALTISSIMA* is distinguished in

SUMMER : leaves alternate, pinnately compound, stipular, margin toothed and with glands at the base of the leaflets; branchlets and petioles glabrous or slightly puberulous; leaflets glabrous on the under side; odor unpleasant when bruised; fruit winged, in paniculate clusters.

WINTER : leaf scars alternate, large; end-bud lacking; twigs yellowish, velvety; lateral buds solitary, smallish, hairy, with 2-4 scales, located close to the leaf scar; odor rank when cut or bruised.

The Genus **ALNUS** is recognized in

SUMMER : by the thick leaves with impressed, reticulate venation; stalked, axillary buds; cone-like fruits; and triangular twigs with a three-sided or triangular pith.

WINTER : by the stalked brown-violet buds with three valvate scales, almost triangular in cross section; twigs and pith triangular; woody cones persistent. Later - in early spring, the flowers with four stamens.

| species | pistillate catkins | winter buds | flowers | twigs | cones | young growth | cone position | leaves |
|-----------|---------------------------------|--|-------------------|---------------------------------------|---|------------------------------|---------------|--|
| viridis | terminal, protected within buds | sessile, with 2 or more unequal scales | with the leaves | more or less pubescent | having seeds with a broad membranous wing | glutinous | | ovate, finely serrulate, broad cuneate, 5-10 pairs veins |
| glutinosa | axillary, exposed | stalked, with 2-3 equal scales; leaves plicate | before the leaves | glabrous, young growth very glutinous | all distinctly peduncled | very glutinous | | green beneath, obtuse, dentate, bearded |
| rugosa | " | " | " | puberulent, rarely densely villous | partly sessile | glutinous | upright | green beneath, serrulate, bearded |
| incana | " | " | " | pubescent | sessile or stalked | tomentose or nearly glabrous | nodding | glabrous beneath or tomentose, not bearded |
| japonica | " | stalked, with 2-3 equal scales; leaves not plicate | " | glabrous or slightly pubescent | peduncled | glabrous | | oblong-lanceolate, acuminate, cuneate, remotely serrate, veins curved, axils bearded |

Winter and Summer Keys combined

-- ALNUS

AILANTHUS

--- ALNUS

The Genus **AMELANCHIER** is recognized in

SUMMER : by the alternate leaves which are thin, light in color tone, simple, oval or oblong, with a finely serrate edge; flowers white, in loose racemes, with 5 slender petals; fruits small berrylike pomes, red or purple, sweet and edible.

WINTER : twigs slender, zigzag, red-gray; buds red, long, slender, sessile, with about 6 twisted scales; leaf-scars two-ranked, slightly elevated, crescent-shaped, with three bundle traces and no stipule scars.

| species | styles | summit of ovary | sepals | habit | buds | leaves | bark | leaf form |
|--------------|------------------------------|-----------------|------------------------------|---------------------------|--------------------------------|--|---|--|
| ovalis | very short distinct | | | | | | | |
| florida | prominent, joined at base, 5 | woolly | short, recurved | shrubby, branches upright | blackish, stout | oval, glabrous, coarsely serrate above the middle | | |
| laevis | " | glabrous | erect | tree to 50-70' | more red than A. canadensis | coarsely callous-serrate, glabrous from the first, often pruinose-purple | red-brown with dark lenticels; abruptly short twigs glabrous pointed, | elliptical, acute or abruptly short |
| oblongifolia | " | " | erect, lance-deltoid | shrubby in dense clumps | | densely white-woolly when young | red-gray oblong, apex rounded or acutish | obovate, or oblong, lenticels; acuminate young twigs hairy |
| canadensis | " | " | ovate, reflexed almost erect | small tree 30-40' | slender, green or tinged brown | densely white-woolly when young; finely serrate | | |

Summer and Winter Keys combined -- **AMELANCHIER**

The Genus **ASIMINA** is distinguished in

SUMMER : by the large, alternate leaves, obovate-oblong, simple, entire, pinnately veined, anastomosing, estipular, short acuminate, cuneate; petiole short; flowers appearing with the leaves, axillary, solitary, deep red-violet, with 3 sepals and 6 petals; fruit a rather large, edible, oval to oblong berry with flattened seeds in 1-2 ranks, greenish-yellow turning brown.

WINTER : shrub or small tree with an unpleasant odor when bruised; twigs moderate, red-pubescent when young, becoming glabrous and brownish; pith terete, white, continuous, with greenish diaphragms, becoming brownish and chambered; terminal bud naked, elongated, red-tomentose, lateral buds oblong or globose, subsessile, oblique; leaf scars alternate, 2-ranked, $\frac{1}{2}$ -round becoming crescent shaped by rupture of membrane over buds, with 5-7 or more bundle traces and no stipule scars

Asimina triloba

The Genus BETULA is recognized in

SUMMER : leaves alternate, petioled, ovate, usually serrate; flowers monoecious, in catkins; fruit a minute nut with membranous wings, formed in cone-like clusters with deciduous, leafy bracts which shed from the tip of the cluster.

WINTER : Twigs slender, zigzag, terete, frequently with dwarf shoots which make the lateral buds appear stalked; pith minute, triangular, greenish; buds moderate, solitary, tapering at both ends, with 2-3 exposed scales, imbricate; leaf scars alternate, half-elliptical, small, with two bundle traces and narrow stipule scars.

| species | habit | bark | bark structure | branchlets | leaf tip | leaves | leaf edge | pubescence |
|--------------------|-------------------------|--|---|--|-------------------------------|--|--------------------------------------|--|
| <i>pumila</i> | shrubby | dark | | densely tomentose, with long hairs | acute | obovate, 4-6 pairs veins, | | pubescent when young |
| <i>nana</i> | shrubby, low, spreading | " | | glabrous, glandless | rounded | suborbicular, gland-dotted beneath, 4-6 pairs veins | | glabrous |
| <i>negra</i> | tree | orange-brown | loose and shaggy | no odor or flavor, pubescent | | rhombic-ovate, 7-9 pairs imbricately veined, often white | | |
| <i>lutea</i> | " | yellowish | splitting in filmy layers | pubescent, slightly flavored, bitterish | oblong-ovate, lighter beneath | tomentose under | | |
| <i>lenta</i> | " | red-brown | firm, cherry-like; not in filmy layers | resinous-glabrous | | oblong-ovate, finely serrate beneath, 7-9 pairs veins | sharply doubly serrate | pale hairs on veins above and below |
| <i>populifolia</i> | " | chalky-white, rubs off slightly | in layers | resinous-glabrous | acuminate | deltoid, long acuminate, 3-7 pairs veins, glabrous, lustrous | | |
| <i>papyrifera</i> | " | white, rubs off freely, exfoliating | splits in thin layers; under ones cream to cinnamon color | pubescent or glabrous, not resinous-glabrous | acute | ovate, base subcordate, veins hairy beneath | coarsely serrate, not deep where cut | hairy only where sheltered |
| <i>pendula</i> | eventually pendulous | creamy-white, scarcely rubs off; exfoliating | fewer layers | resinous-glabrous | " | rhombic-ovate acuminate cuneate | serrate deeply cut | persistently leaves glutinous when young |

Summer and Winter Keys combined -- BETULA

The Genus *CARYA* * is distinguished in

SUMMER : trees with a hard, tough wood and scaly buds; leaves alternate, pinnately compound, the tip three leaflets larger than the lower ones, stipulate; flowers with the leaves, of two kinds on the same tree, in catkins, the staminate flowers in axillary, pendulous aments, the pistillate flowers sessile, in terminal spikes; fruit a nut in a 4-valved husk.

WINTER : twigs terete, moderate, stiffly held; buds rather large, sometimes stalked or superposed, the terminal bud much larger than the laterals, ovoid or oblong, with one to several exposed scales; leaf scars alternate, shield shaped or 3-lobed, large, low, with numerous bundle traces in about three more or less definite groups, and without stipule scars.

| species | bud
scales | fruit
with
winged
sutures | nut
shell | leaflet | nut | winter
buds | nut
husk | leaves | bark | leaves &
petioles | twig
color |
|-------------|------------------------------|------------------------------------|--------------|-----------------------------------|---|--|---|-----------------------------------|------------------------|--|--------------------------------------|
| pecan | 4-6
valvate | with
winged
sutures | thin | 7-17
falcate | elongated
terete,
shell thin,
sweet | slender,
elongated | splitting
to base,
thin | | | tomentose,
glandular
when
young | |
| cordiformis | 4-6
valvate | with
winged
sutures | thin | 5-9
falcate | compressed
broad as
long,
bitter | stout,
glandular,
bright
yellow | splitting
to below
middle | | | | |
| laciniosa | imbricate,
more
than 6 | sutures
not
winged | thick | not
falcate
leaflets
7-9 | | outer
scales
persistent | splitting
to base | with
7-9
leaflets | shaggy | glabrous
or
pubescent | pale
orange |
| ovata | " | " | " | not
falcate
leaflets
5 | | " | very thick
splitting
to base | with 5
leaflets | shaggy | " | gray
to
light
red-
brown |
| tomentosa* | " | " | " | not
falcate | angled,
kernel
sweet | outer
scales
deciduous;
bud large
1-1 1/2" | not
splitting
to base | 5-7
leaflets | firm,
not
shaggy | tomen-
tose | |
| glabra | " | " | " | " | slightly
or not
angled,
kernel
bitter | small
1-1 1/2" | thin,
splitting
only to
middle | 5, rarely
7 lflts.
glabrous | firm,
not
shaggy | glabrous | |

The Genus *CASTANEA* is recognized in

SUMMER : leaves alternate, simple, straight-veined, oblong, rather acuminate to acute, coarsely serrate with bristle-like teeth; nuts enclosed in a prickly bur formed by the involucre; nuts terete; staminate flowers in slender aments.

WINTER : by the moderate, stiff, more or less fluted twigs with a continuous star-shaped pith; bark gray, fissured, with smoothish ridges; buds ovoid, sessile, oblique, with 2-3 exposed scales; leaf scars alternate, scarcely raised, moderate to small in size, $\frac{1}{2}$ -round, with 3 bundle traces and with elongated, unequal stipule scars; twigs olive brown, polished or hairy.

| species | nuts | habit | branchlets | leaves | twigs |
|-------------------|--|---------|-----------------|---|-----------------------|
| <i>pumila</i> | higher than broad, solitary in a spiny involucre | shrubby | | elliptic-oblong, tomentose beneath | tomentose |
| <i>dentata</i> | broader than high, 2 or more in one involucre | tree | glabrous | oblong-lanceolate, glabrous, base cuneate | olive-brown, polished |
| <i>mollissima</i> | " | " | short pubescent | elliptic-oblong, soft pubescent beneath, base rounded | dull, hairy |

Summer and Winter Keys combined --- *CASTANEA*

The Genus *CARPINUS* is recognized in

SUMMER : leaves deciduous, alternate, simple, pinnately veined with 7-24 pairs straight veins, with the base symmetrical and the margin doubly toothed, more or less 2-ranked; fruit a small, ribbed nutlet enclosed in a 3-pronged involucre; fruits in a spike-like, drooping cluster.

WINTER : bark smooth and firm, muscular appearing; twigs slender, zigzag; buds solitary, 2-ranked, acute, with many imbricate scales in 4 rows.

| GENUS | bark | bud scales | leaves | staminate catkins | involucre |
|-----------------|------------------------------------|------------------------|--|---------------------|--------------------------|
| <i>Carpinus</i> | smooth and firm | in 4 rows, not striate | ovate-oblong, glabrous except veins pilose beneath and with axillary tufts of hair | appearing in spring | 3-cleft, leafy |
| <i>Ostrya</i> | rough and shredding in long strips | in 2 rows, striate | ovate to ovate-oblong, larger, sparingly hairy above and below | formed in autumn | a bladderlike closed bag |

Summer and Winter Keys combined

CASTANEA --- *CARPINUS*

The Genus CATALPA is recognized in

SUMMER : leaves very large, simple, ovate, long-petioled, with an acute to acuminate tip and entire margin, 3-5 veined at the base, usually with a purplish glandular spot in the vein-axils beneath; flowers white or yellowish in large, showy panicles; fruit a long, terete, 2-valved pod with thin, ciliate seeds wrapped around a central partition.

WINTER : twigs coarse, yellow to yellow-gray; leaf scars whorled, elliptical, raised, with many bundle traces arranged in an ellipse; buds comparatively small, solitary and sessile, with 6 or more loose, pointed scales; terminal bud lacking; fruits persistent.

| species | habit | flowers | leaf form | leaf tip | seed wings | fruits | branches |
|--------------------------------|-------------------------------|----------------------------|--|-------------------------------|--------------|-----------------------------------|---------------------------------------|
| bungei (or big-nonioides nana) | low, formal mound-top grafted | white in corymbose racemes | triangular-ovate, glabrous beneath | long-acuminate, base truncate | | | |
| ovata* | tall, loose spreading tree | yellowish | broad-ovate, 3-5 lobed, nearly glabrous | | | long, very slender, 1/8" diameter | glabrous |
| bignonioides | " | white, glabrous | not or seldom lobed, ovate, pubescent on veins below | abruptly acuminate | pointed ends | long, slender 1/4" diameter | light brown, crooked and straggling |
| speciosa | " | " | not or seldom lobed, ovate, densely pubescent below | long acuminate | rounded ends | coarser, 1/2" diameter | red-brown, not crooked and straggling |

Summer and Winter Keys combined --- CATALPA

CEDRELA SINENSIS : is distinguished in

SUMMER : leaves alternate, pinnately compound, eglandular, stipular, long petioled; leaflets 10-20, short-stalked, oblong to lance-oblong, acuminate, remotely serrate or entire, pubescent on the veins at first, becoming glabrous; flowers small, whitish, in large pendulous panicles; fruit an obovoid capsule with winged seeds.

WINTER : tree with smoothish or shredding bark; twigs coarse, terete, puberulous when young, with a large, rounded pith which is white at first becoming brownish; leaf scars large, alternate, heart-shaped, slightly raised, with 5 bundle traces and no stipule scars; buds solitary, sessile, subglobose, with 4 or more short pointed scales; end-bud much larger.

This tree is very similar to *Allanthus* but easily distinguished therefrom by the large end-bud and by the absence of glands at the base of the leaflets.

The Genus *CELTIS* is recognized in

SUMMER : tree with a rough, corky, light gray bark; leaves simple, alternate, thin and rough to touch, serrate, with 3 main veins at the base; fruit a small, globular drupe, with a date-like flavor; pith somewhat angular, occasionally chambered.

WINTER : unarmed; bark light gray, corky; twigs slender, zigzag, brownish, odorless; terminal bud lacking; leaf scars alternate, small, with one bundle trace (or appearing as one); pith rather angular, chambered in places; buds small, appressed, somewhat triangular.

| species | bark | buds | leaves | fruit pedicel |
|---------------------|---------------------------------|-------|---|--------------------------|
| <i>occidentalis</i> | with thick, corky, curly ridges | long | ovate to ovate-oblong, subcordate, sharply singly serrate, acuminate | longer than the petiole |
| <i>laevigata</i> * | with corky warts | short | ovate to oblong-lanceolate, almost entire, long acuminate, base broad cuneate | shorter than the petiole |

CERCIDIPHYLLUM JAPONICUM is distinguished in

SUMMER : leaves opposite, simple, petiolate, suborbicular, obtusish, cordate, palmately veined, dark bluish-green above, glaucous beneath, margin crenate-serrate; twigs swollen at the nodes by the much raised leaf cushions.

WINTER :

a small tree; twigs glabrous, much enlarged at the nodes; leaf scars opposite or 4-ranked, crescent-shaped, raised, with 3 bundle traces and no stipule scars; buds often developing short spurs, moderate, solitary, oblong, pointed, appressed, with one exposed scale.

CERCIS CANADENSIS is distinguished in

SUMMER : leaves alternate, simple, suborbicular, cordate, petiolate, entire, palmately veined, with small caducous stipules; flowers fascicled, before the leaves, rosy-pink, pealike, adventitious; fruit a flat legume, narrowly winged on the ventral suture.

WINTER : shrub or small tree; bark very dark with reddish fissures; twigs blackish, zigzag, pith rounded, continuous; leaf scars alternate, 2-ranked, somewhat raised, obtusely triangular, fringed at the top, with decurrent ridges, having 3 bundle traces and no stipule scars; buds glabrous, superposed, the upper stalked, the lower sessile, ovoid or obovoid, with 2 to several often keeled scales; end-bud lacking, flower buds adventitious.

CLADRASTIS LUTEA is distinguished in

SUMMER : leaves alternate, pinnately compound, estipular; leaflets alternate, short-stalked, rather large, elliptic to ovate, entire, short acuminate; petiole swelled to cover the bud; branchlets red-brown.

WINTER : tree with smooth bark and yellow wood; twigs red-brown; leaf scars alternate, almost enclosing the bud, 2-ranked, C-shape, with 3-5 bundle traces and no stipule scars; buds naked, silky brown hairy, in aggregates resembling single buds, sessile.

CELTIS -- *CERCIDIPHYLLUM* -- *CERCIS* -- *CLADRASTIS*

The Genus CORNUS (tree forms) is recognized in

SUMMER :leaves opposite, simple, entire, with the veins parallel, curving, and anastomosing, petiolate. (N.B. one species shows alternate arrangement); floral parts in fours; fruit a small drupe

WINTER : by the rather slender twigs, terete, with a white, continuous pith; leaf scars opposite except in C.alternifolia, connected around the twig, crescent or V-shaped, raised on young wood, with 3 bundle traces and no stipule scars; buds solitary, stalked, oblong, with two scales valvate or nearly so; flower buds conspicuous for size and shape.

Summer Key

| species | arrangement | fruit | flower-heads | leaves |
|--------------|-------------|-------------------------------------|--|---|
| alternifolia | alternate | blue-black, bloomy, on red pedicels | terminal, loose, flat cymes, without an involucre | with 5-6 pairs veins, base cuneate, margin entire |
| mas | opposite | red | opposite, terminal or axillary dense umbels, with involucre flowers yellow | green beneath, glabrous |
| florida | opposite | red | dense terminal cymes with showy white involucre notched at tip | whitened beneath |
| kousa | opposite | red, connate in globose head | dense terminal cymes with showy white involucre pointed at tips | glaucous beneath with large axillary tufts of hairs |

Winter Key

| species | leaf scars | leaf buds | flower buds | leaf axils | branchlets |
|--------------|-----------------|-------------------------------|-------------------------------|-----------------|-----------------------|
| alternifolia | alternate | | | | glabrous, greenish |
| kousa | opposite | concealed in leaf scars | enlarged | brown hairy | |
| florida | opposite raised | concealed in leaf scars | enlarged flattened lengthwise | not brown-hairy | reddish on upper side |
| mas | opposite | not concealed, very divergent | enlarged, ovate to obovate | | |

The Genus *CRATAEGUS* is distinguished in

SUMMER : thorns long, stiff, sharp-pointed; leaves simple, alternate, stipulate, toothed or lobed; flowers in corymbs; fruit a pome-like drupe, with 1-5 bony nutlets.
WINTER : thorns long, stiff, sharp-pointed; buds short, stout, hard, with fleshy red scales.

| species | leaves | fruit | veination | leaf edge | lobes | petioles | anthers | thorns |
|--------------------|---|--|---|--------------------------------------|--------------------------|-----------------|-----------------------|----------------------------|
| <i>phaenopyrum</i> | deltoide, subcordate, subcoriaceous, with 3-5 lobes, glabrous lobed, broad ovate to obovate, cuneate glabrous, yellow-green beneath | scarlet, with 5 nutlets, small corymbose red, subglobose, with 1-2 nutlets | to points of lobes & sinuses lower or secondary veins | sharply serrate | 3-5 | | | long, slender |
| <i>oxyacantha</i> | to obovate, cuneate glabrous, yellow-green beneath | red, subglobose, with 1-2 nutlets | lower or secondary veins | broadly serrulate | 3-5 deep-cut | | | short or lacking |
| <i>monogyna</i> | lobed, broad ovate to obovate, blue-green beneath | ellipsoid, with 1 nutlet | curved in secondary veins | entire or few-teeth | 3-7 or more | | | " |
| <i>crusgalli</i> | oval to obovate, not lobed, thick & leathery, very glossy, cuneate | dull red, subglobose, glabrous without cavities and on the 2 nutlets | to points of lobes and teeth not impressed | sharply serrate except near the base | not lobed | short | | moderate, numerous, curved |
| <i>punctata</i> | obovate or oval, cuneate, dotted, dull surfaced | dotted red, ellipsoid, with 3-5 nutlets | impressed, villous below | irregularly serrate | not or very little lobed | short, margined | inflorescence villous | stout & short or wanting |
| <i>succulenta</i> | broad-elliptic, not lobed, cuneate lustrous | subglobose, bright red with 3 nutlets | " | coarsely doubly serrate | long & slender | | rose-color | long, stout |
| <i>coccinea</i> | ovate, lobed, large acute, cuneate | globose, scarlet red, pulpy, pubescent, 3-4 nutlets | " | sharply doubly serrate | regularly lobed | moderate | yellow | stout, curved |

DIOSPYROS VIRGINIANA is recognized in
SUMMER : leaves alternate, long, elliptic, drooping, entire, stipulate; bark fissured in rectangles; petioles moderate to short; flowers dioecious, regular, axillary, inconspicuous; fruit a several seeded berry with the calyx persistent, seeds flattened.
WINTER : bark checkered; young branchlets pubescent or glabrous; twigs moderate, terete, yellow-gray to red-brown, lenticular; pith moderate, greenish-white; buds ovoid, flattened, with 2-3 overlapping scales, solitary, sessile; terminal bud lacking.

CRATAEGUS --- *DIOSPYROS*

The Genus FAGUS is distinguished in

SUMMER : bark smooth, gray; leaves alternate, simple, green beneath, 2-ranked, plicate in the bud, with strong, straight veins parallel and ending each in a tiny tooth; flowers of two kinds, the staminate in heads, the pistillate paired in a 4-parted involucre; fruit a triangular nut, in pairs in a prickly 4-parted involucre.

WINTER : bark silver-gray, smooth; buds slender, golden-brown, cigar-shaped.

Summer Key

| species | veination | leaf edge | fall color | bark | color of veins and petioles | leaves |
|--------------------|------------------|----------------------|---------------|-----------------------|-----------------------------|--------------------------|
| grandifolia* | 9-14 pairs veins | coarsely serrate | yellow-bronze | very light gray | green | ovate-oblong, acuminate |
| sylvatica | 5-9 pairs veins | remotely denticulate | red-bronze | medium gray | green | ovate or elliptic, acute |
| sylvatica purpurea | 5-9 pairs veins | denticulate | red-bronze | deeper, purplish gray | red | " |

Winter Key

| species | twigs | buds | bud color | bark |
|--------------------|-----------|---|------------------------|---------------------|
| grandifolia* | glabrous, | lustrous, elongated, with about 8 pairs of scales | yellow-brown, lustrous | light gray |
| sylvatica | villous | slightly puberulent | red-brown, silky dull | deeper, medium gray |
| sylvatica purpurea | villous | puberulent, moderate | deeper, red-brown | deep gray |

The Genus *FRAXINUS* is distinguished in

SUMMER : trees with opposite, pinnately compound leaves, the margin toothed but not lobed; flowers small, in crowded panicles from the axils of last year's leaves; fruit a small nutlet with an elongated wing at the top.

WINTER : twigs stout, stiff, widely divergent; leaf scars rather large, opposite, $\frac{1}{2}$ -round to almost elliptical, with numerous bundle traces in an elliptical or C-shaped group and with no stipule scars; buds sessile, sometimes superposed, with 1-2 pairs of opposite scales.

Summer Key

| species | twigs | lateral leaflets | rachis | parts | leaves beneath | leaf edge |
|----------------------|--------------|---|----------------------------|-----------------|--------------------------------------|-----------------------------------|
| <i>quadrangulata</i> | 4-angled | 7-11 | | | | |
| <i>nigra</i> | not 4-angled | 7-11, oblong, sessile | with thick rufous tomentum | | rusty-tomentose along the midrib | serrate with small incurved teeth |
| <i>excelsior</i> | not 4-angled | 7-11, sessile | without rufous tomentum | glabrous | glabrous or pubescent on midrib only | serrate |
| <i>pennsylvanica</i> | not 4-angled | ovate to oblong-lanceolate, 5-9, petiolate | not winged | rusty-pubescent | pubescent beneath | |
| <i>lanceolata</i> | not 4-angled | elliptic-oblong, to lanceolate 5-9, petiolate | not winged | glabrous | glabrous, as green as the upper side | finely, sharply serrate |
| <i>americana</i> | not 4-angled | ovate, slender-petiolate, 5-9 | not winged | glabrous | pale, glaucous | obscurely serrate or entire |

twigs, petioles, veins, and buds

Winter Key

| species | twigs | buds | twig near tip | bud scales | bark | leaf scars | inner bark |
|----------------------|--------------|---------------------------------|---------------------|-----------------------------|-------------------|----------------------|-----------------------|
| <i>quadrangulata</i> | 4-angled | | | | | | inner bark |
| <i>excelsior</i> | not 4-angled | black or nearly black | | | | | turns water blue |
| <i>pennsylvanica</i> | not 4-angled | rusty tomentose, pointed at tip | densely pubescent | | | | |
| <i>nigra</i> | not 4-angled | not tomentose, dark brown | not downy | 3 pairs with apex apiculate | | concave on top edge | inner surface reddish |
| <i>lanceolata*</i> | not 4-angled | brown | not downy | 4 pairs with rounded apex | | | |
| <i>americana</i> | not 4-angled | brown, very blunt at tip | not downy, lustrous | 4 pairs with rounded apex | ridged, not flaky | straight on top edge | yellowish |
| | not 4-angled | | | | ridged, not flaky | upper edge | |
| | | | | | not flaky | deeply concave | |

GINKGO BILOBA is recognized in

SUMMER : leaves alternate, clustered on short spurs, fan-shaped, slender petioled, more or less incised at the tip, striated by the parallel veins.

WINTER : branches irregularly placed and without lateral twigs near the tips; twigs yellow-gray, moderate, rounded; leaf scars alternate, crowded on short spurs, crescent-shaped, low, with 2 bundle traces and no stipule scars; buds brown, solitary, sessile, hemispherical with three or more scales.

GLEDITSIA TRIACANTHOS is recognized in

SUMMER : a large tree armed with stout, much branched spines which persist on the trunk; leaves alternate, often fascicled, pinnate or bi-pinnate on the same tree; leaflets small, obtusish, elliptic to oblong-lanceolate, entire; flowers in small, greenish racemes, inconspicuous; fruit a long, twisted, red-brown legume, indehiscent, many-seeded.

WINTER : spines numerous and much-branched, very large; twigs zigzag, moderate, with swollen nodes; leaf scars comparatively large, irregularly shield-shaped, rimmed red and appearing sore and inflamed; buds glabrous, sessile, superposed, often more or less covered by the torn margin of the leaf scar, with few scales; end-bud lacking.

GYMNOCLADUS DIOICUS is recognized in

SUMMER : leaves alternate, doubly pinnately compound, very large; leaflets ovate, of medium size, acute, rounded at the base, short-stalked, entire; flowers of two kinds, greenish and inconspicuous; fruit a short, thick and broad, beanlike pod, with several suborbicular seeds.

WINTER : tree, unarmed, with stout branches and a gray bark which appears as though of many small flakes rolled up on one edge; twigs thick, glossy, brown overcast with white as if painted, and with small lenticels; buds minute, superposed, set in tiny, silky craters, removed from the leaf scar as much as 1/8" or more; leaf scars alternate, large, irregularly heart-shaped, little raised, with 3-5 large, rather indefinite bundle traces and sometimes with minute stipule scars fringed at the top.

HALESIA CAROLINA * is recognized in

SUMMER : a large shrub or small tree with the bark shredding and marked by whitish fissures; leaves alternate, simple, elliptic to ovate-oblong, finely serrate, acute or acuminate, base cuneate or rounded, stipular, tomentose at first, becoming glabrous above but remaining pubescent below; flowers white, often tinged pink, bell-shaped, puberulous, pendulous in axillary clusters on last year's wood; fruit an obovoid-oblong dry drupe with four longitudinal wings and with the tip elongated in a point.

WINTER : bark gray or brown-gray marked with whitish fissures; twigs moderate, with a stellate-scurfy bark which shreds off in fine, hairlike threads; pith smallish, terete, white, finally chambered; leaf scars alternate, moderate, somewhat raised, $\frac{1}{2}$ -round, notched, with one crescent-shaped bundle trace and no stipule scars; buds moderate, superposed, ovoid, with about four fleshy red scales.

GINKGO -- GLEDITSIA -- GYMNOCLADUS -- HALESIA

The Genus JUGLANS is distinguished in

SUMMER : leaves alternate, pinnately compound, stipulate, with numerous, opposite leaflets, aromatic, serrate or entire; monoecious flowers in catkins, the staminate lateral and drooping, the pistillate in terminal racemes in the axils of bracts; fruit a nut with an indehiscent husk. **WINTER** : trees with stout, more or less fluted twigs; pith chambered with rather close, thin plates; leaf scars alternate, rather large, shield-shaped or three lobed, raised, with 3 compound bundle traces and no stipule scars; buds moderate, sessile, velvety, with few scales, superposed, the terminal bud much larger than the lateral ones.

Winter Key

| species | bark | pith | terminal bud | leaf scar | twigs | buds | pith diaphragms |
|-------------|---|-----------------|--------------|---|--------------------------------|-----------|-------------------------|
| cinerea | light gray with wide smooth margins dark, with rough ridges | chocolate brown | elongated | with a downy ridge, not notched | moderate, pubescent, glandular | slender | |
| sieboldiana | " | creamy | elongated | with a downy ridge, and notched without a downy ridge | very stout | stout | |
| nigra | " | " | short | " | gray-pubescent | canescent | close together |
| regia | light gray, smooth | " | " | " | glabrate | glabrate | widely spaced (8 to 1") |

Summer Key

| species | leaflets | pith diaphragms | terminal leaflet | fruit surface | nut | pith color |
|-------------|--|-----------------|---------------------|---------------|---|-----------------|
| regia | entire or nearly so, glabrous, 7-9 serrate | widely spaced | | glabrous | wrinkled but not rough, with thin partition | creamy |
| nigra | " | closely spaced | often not developed | glabrous | ridged, rough, with thick, bony partition | creamy |
| sieboldiana | " | " | well developed | sticky-hairy | rugose or nearly smooth | creamy |
| cinerea | glandular, pubescent, with spreading teeth | " | " | " | elongated, ridged rough | chocolate brown |

KALOPANAX PICTUS is recognized thus

SUMMER : a tree with stout, prickly branches; leaves alternate, simple, palmately veined and lobed, suborbicular, 5-7 lobed, with very long petioles, lobes acuminate and serrate; flowers small, whitish, in umbels; fruit a 2-seeded drupe, subglobose, bluish-black.

winter ; tree with coarse branches and thick twigs, armed with numerous short, stout prickles, these found both on nodes and internodes; twigs terete, often forming spurs; pith moderate, large, continuous, white; leaf scars alternate, narrowly crescent-shaped or U-shaped, somewhat raised, with 5 small bundle traces and no stipule scars; buds solitary, sessile, conical-ovoid, with about three, exposed, thin scales.

KOELREUTERIA PANICULATA is recognized thus

SUMMER : an unarmed small tree; leaves alternate, pinnately or bi-pinnately compound; leaflets 7-15, serrate, hairy, occasionally glabrous, coarsely and irregularly crenate-serrate, at the base often incisedly lobed; flowers yellow, small, in large, loose panicles in midsummer; fruit an oblong-ovoid, 3-valved, bladder capsule with papery walls and with 3 roundish, black seeds.

WINTER : twigs moderate, orange-brown, lenticular; pith rounded, continuous, white; leaf scars alternate, raised, rather large, shield-shaped, with 3 compound bundle traces or a jagged, irregular series, and without stipule scars; buds moderate, solitary, $\frac{1}{2}$ -ellipsoid, sessile, set at almost right angles to the twig, and with 2 exposed scales; end-bud lacking.

LABURNUM ANAGYROIDES* is recognized thus

SUMMER : leaves alternate, palmately compound, with 3 leaflets, petiolate; leaflets elliptic-obovate, ciliate with silky hairs, subsessile, obtuse, broadly cuneate; flowers yellow, in pendulous terminal racemes, pealike; fruit a legume, with a thick keel, appressed-pubescent, compressed, dehiscent.

WINTER : twigs slender, green, appressed-pubescent, terete, or slightly fluted; leaf scars alternate or rarely opposite, small, elevated, transversely elliptical, with 3 bundle traces confluent or indistinct, and the stipules persistent on the leafy cushion; buds moderate, solitary, sessile, silvery silky-hairy, ovoid, with 2-4 outer scales scarred at the top.

The Genus *MALUS* is distinguished thus

SUMMER : trees without true spines but with often thornlike spurs; leaves alternate, simple, sometimes lobed, toothed on the margin, with small, soon falling stipules; flowers regular, in umbel-like clusters; fruit a fleshy pome.

WINTER : twigs moderate, rounded, somewhat spinescent, usually dull, deep red in color; leaf scars alternate, raised, or the nodes swollen below them, linear or U-shaped, with 3 bundle traces and no stipule scars; buds moderate, solitary, sessile, with about 4 exposed scales slightly keeled above and imbricate, end-bud sometimes lacking.

| species | leaves in bud | calyx | calyx lobes | styles | pedicels | leaves | flowers | fruit |
|-------------------|---------------|------------|--|-----------------------------|-----------------------|---|--|---|
| pruni-
folia | rolled | persistent | longer than tube
acuminate | --- | --- | dull, sharply
serrate | calyx with a
fleshy base | ovoid
apex
attenuate |
| specta-
bilis | " | " | shorter than tube,
acute | --- | pubescent | lustrous, broad
crisp, cuneate | calyx
pubescent | slender
stalked,
cuneate |
| baccata | " | deciduous | longer than tube,
narrow-lanceolate | 5 rarely 4 | glabres-
cent | glabrous above,
serrate | white, buds
cherry-red | " |
| halli-
ana | " | " | shorter than tube,
triangular-ovate
obtusish | 4-5 | glabrous,
purplish | margins closely
serrate or entire | white, buds
cherry-red | " |
| sykes-
tris | folded | persistent | tomentose,
reflexed | 5 villous
at base | " or less | tomentose below,
closely
crenate-serrate | white or pink | small,
pyri-
form |
| loensis | " | " | tomentose, erect
or spreading | " | 1" or
more | tomentose below
lobed or strongly
veined, doubly
serrate | usually
large | green,
fleshy,
greenish
fragrant |
| angusti-
folia | " | " | glabrous | 5 villous
at base | slender | hard, thin, oblong
glabrous, obtusish
crenate-serrate | pink, very
fragrant | " |
| coron-
aria | " | " | " | " | " | ovate, hard, thin,
acute, doubly ser-
rate, often lobed | " | red or
yellow,
small |
| torin-
goidea | " | deciduous | glabrous without,
puberulent within | 3-4, glabrous
dull red | slender | undivided or
partly 3-lobed | intense car-
mine in bud,
pink in blos-
som, very early
first to bloom | very small
red or
orange-
yellow
4" diam. |
| flori-
bunda | " | " | glabrous or
puberulent | 4, connate
to middle | glabrous | never lobed, base
cuneate, ovate or
oblong, acute, irre-
gularly serrate | " | medium,
yellow,
4" diam. |
| arnold-
iana | " | " | " | " | " | " | suborbicular
petals, pink
fading except
margins | red, very
dark |
| schied-
eckeri | " | " | pubescent | " | pubescent | sharply serrate,
pubescent below | " | " |
| sargen-
ti | " | " | glabrous without
pubescent within | villous base
and connate | glabrous | often lobed, ser-
rate, habit low,
spreading | pink, base of
petals cuneate
sepals long | " |
| zumt | " | " | " | " | " | entire, only up-
per lobed | petals pink,
cuneate; sepals
shorter or longer
as tube | " |
| sie-
boldi | " | " | " | " | " | all lobed and
serrate | " | " |

MALUS

The Genus MORUS is recognized thus

SUMMER : leaves alternate, simple or variously lobed, coarsely toothed, with 3-5 veins at the base, broadly ovate, with lanceolate, deciduous stipules; flowers in stalked, axillary, drooping catkins; fruit an aggregate of drupelike achenes, resembling a blackberry, sweet, edible.

WINTER : trees with a scant, milky sap; twigs moderate, terete, with a continuous pith; leaf scars alternate, round or half-round or rather triangular, slightly raised, with numerous bundle traces scattered or in an ellipse, and with narrow stipule scars, of which the one below the bud is the larger; buds sessile, solitary or collaterally multiple, ovoid, oblique, with about 3-6 2-ranked thin scales; end-bud lacking.

| species | leaves | buds | leaf base | bark | fruit | habit |
|---------|--|--|------------------------------|---------------------------------|-------------------------|----------------|
| alba | smooth above with axillary hairs beneath, thin, glossy colored | triangular, ovoid, short, buff yellow, closely appressed, scales uniformly colored | | yellow to orange | white, pink or purplish | spreading tree |
| rubra | scabrous above, pubescent beneath closely, sharply serrate | buds more elongated, somewhat spreading, green scales dark-margined | truncate or slightly cordate | darker, twigs often downy above | ovoid to oblong | to tree |

MYRTICA CERIFERA : see key for Myrica in shrub section.

NYSSA SYLVATICA : is recognized thus

SUMMER : tree; leaves alternate, simple, obovate or oblong, entire, acute or obtusish, cuneate, lustrous above, glaucescent beneath, glabrous; flowers inconspicuous, small, greenish on hairy peduncles, polygamo-dioecious, in axillary clusters; fruit an oblong-ovoid, blue drupe.

WINTER : mature branches spreading horizontally; twigs moderate, terete, glabrescent to glabrous; pith white, continuous, crossed by diaphragms; leaf scars alternate, broadly crescent-shaped or triangular, sometimes becoming U-shaped by rupture of a tegument, with 3 bundle traces and no stipule scars.

OSTRYA VIRGINIANA is recognized thus

SUMMER : leaves medium sized, oblong-ovate to ovate, alternate, simple, pinnately veined, subordinate base, margin doubly serrate; flowers without perianth, the staminate pendulous, with 3-14 stamens, the pistillate aments, upright; fruit a ribbed nutlet in a bladderlike involucre with stiff hairs at the base, in a pendulous raceme.

WINTER : small tree with brown scaly bark which peels in long strips; twigs slender, zigzag, with pale pith; leaf scars alternate, 2-ranked, slightly raised, small, crescent-shaped or 2-elliptical, with 3 bundle traces and with elongated, unequal stipule scars; buds ovoid, pointed, with many imbricate scales in two rows, sessile, solitary, rarely superposed, oblique, end-bud lacking.

PAULOWNIA TOMENTOSA* is recognized thus

SUMMER : tree; leaves opposite or whorled, large, ovate, palmately veined, hairy beneath, petiole often hollow, upper side pubescent, with minute cup-shaped glands at the base of the veins; flowers violet, in large panicles, fragrant; fruit an ovate, pointed capsule.

WINTER : twigs stout, resembling Catalpa, compressed at nodes; pith large, white, terete, chambered or excavated in the internodes; leaf scars opposite, subelliptical, more or less notched at top, raised, with many bundle traces in an almost completed ellipse, and no stipule scars.

The Genus *PHELLODENDRON* is recognized thus
SUMMER : by the opposite arrangement; leaves pinnately compound, with opposite, crenulate leaflets, punctate with pellucid dots, aromatic with a turpentine-like odor; buds concealed in the base of the petiole; flowers dioecious, small, greenish, in terminal panicles or corymbs.
WINTER : aromatic trees; bark yellow when cut; twigs moderate, terete, with a brown, continuous pith; leaf scars opposite or almost opposite, horseshoe shaped, raised, medium large, with 3 bundle traces which may be compound, and no stipule scars, naked, solitary, sessile, lustrous silky red-brown, the silky hairs covering the overlapping of the two scales, flattened vertically and almost surrounded by the leaf scar.

Summer Key

| species | margin | upper side of leaves | under side | base of leaflets | leaf rachis | inflorescence |
|--------------|--------------------------|----------------------|--------------------|---------------------------------|---|-----------------|
| amurense | ciliate | lustrous | glabrous, glaucous | rounded | | puberulous |
| sachalinense | not or sparingly ciliate | dull | glabrous | cuneate or rounded | | glabrous |
| japonicum | | dull | gray-villous | truncate or subcordate, oblique | densely tomentose, leaves broadly ovate | hoary-tomentose |

Winter Key

| species | twig color | lower bark | twig texture | fruit clusters |
|--------------|------------|-----------------------------|--------------|---------------------------------|
| amurense | orange | thick, corky, light gray | glabrous | |
| sachalinense | red-brown | thin, not corky, dark brown | glabrous | branched, winter buds red-downy |
| japonicum | red-brown | thin, not corky, dark brown | pubescent | distinctly branched |

The Genus *PLATANUS* is recognized thus
 summer : arrangement alternate; leaves large, palmately 3-5 lobed, coarsely and acutely toothed;
 long petioled with the buds concealed in the base of the petiole, the stipules sheathing
 with the petiole margin; fruits in globose, long-stalked aggregates.

WINTER : large trees with the bark exfoliating in large, thin plates; twigs moderate, terete, glabrous, buff colored, zigzag, with a continuous pith; leaf scars alternate, 2-ranked, raised, scalloped, and completely encircling the buds, with 5 or more rather large bundle traces, and narrow stipule scars encircling the twig; buds solitary, sessile, large, conical, with a single closed scale; the end-bud lacking.

Summer and Winter Keys combined (fruit and bark constitute winter identification)

| species | fruit heads | leaves | sinus | seeds | leaf edge | base | bark | petioles |
|--------------|---|---|----------|---------|---------------------|------------------------------|--|--|
| orientalis | racemose,
3 or more per
pedicel,
bristly | usually with
5 main veins,
seldom 3 | deep-cut | pointed | dentate | wedge or
heart-
shaped | scales very
freely, greenish-
white | green |
| acerifolia | two, race-
mose, bristly
(rarely 3) | 3-5 lobes, the
middle lobe
about as long
as broad | moderate | | coarsely
toothed | truncate | scales freely | greenish
white,
mottled |
| occidentalis | usually
solitary,
smoothish | with 3 main
veins (rarely
5), downy be-
neath, lobes
longer than
broad | shallow | blunt | | deeply
cordate | scales less freely
hardly at all
from young trees,
almost white | young growth
densely brown
tomentose |

The Genus **POPULUS** is recognized thus
SUMMER : trees with a furrowed, light colored bark and rounded or angled twigs, and resinous buds, the terminal bud usually present; leaves alternate, long-stalked; petioles usually flattened, the ovate, triangular or rhomboid in shape, margin dentate or serrate; flowers in pendulous catkins before the leaves;; fruits ripening before leaves are fully out.

Summer Key

| species | under side of leaves | buds | leaf form | leaf border | petioles | leaves | branches | leaf margin | leaf base |
|---------------|--|--------------------|-----------|-----------------|------------------------------|--|--------------------|---|--|
| alba | white or gray tomentose glabrous waxy glabrous | tomentose glabrous | lobed not | not translucent | | | | | |
| simoni | | | | | terete, long compressed | rhombic-ovate to obovate, glabrous broadly deltoid-ovate | angled not " | crenate-serrulate coarsely serrate | cuneate |
| deltoides | | | | | | | | coarsely serrate, teeth curved finely glandular-serrate | truncate, entire cordate or subcordate |
| tremuloides | " | " | " | " | " | ovate to orbicular, short acuminate, small, thin, less than 3" | " | | |
| grandidentata | " | " | " | " | " | ovate, large 3-5" long | slightly tomentose | | |
| nigra | " | " | " | translucent | " | rhombic-ovate | not angled | coarsely serrate, teeth callus-mucronate finely crenate | truncate, to broad cuneate |
| candicans* | " | " | " | " | essentially terete, glabrous | ovate-lanceolate | " | serrate coarsely crenate-serrate, ciliate | cuneate, without glands cordate, with glands |

The Genus *POPULUS* is recognized thus

WINTER : deciduous trees with the upper bark smooth and colored greenish, or whitish or orange, and the lower bark gray and deeply fissured; twigs moderate or coarse, terete or 5-angled; pith rather small, 5-angled, brownish, almost continuous; leaf scars alternate, on raised cushions, broadly crescent shaped or triangular, inclined to be 3-lobed, with 3 bundle traces and narrow stipule scars;; buds moderate to small, the terminal one enlarged, appressed or curved out, sessile, solitary, with the lowermost scale centered over the leaf scar, usually resinous; terminal bud present; catkin scales laciniate.

Winter Key

| species | twigs | buds | lateral buds | branchlets | bark |
|----------------------|--|---|-----------------------------------|---------------------------------------|----------------------------|
| <i>alba</i> | white-downy | white downy | | white downy when young | whitish or greenish-gray |
| <i>simoni</i> | glabrous, ridged or angled | pointed, erect, not white-downy | | yellowish, slender, terete, angled | yellow-gray |
| <i>grandidentata</i> | gray-tomentose at first, then glabrous, not ridged | puberulous to gray pubescent, dusty, ovoid | widely divergent | red-brown, rather coarse | upper bark light, greenish |
| <i>tremuloides</i> | glabrous, not ridged | ovoid, pointed, glabrous, lustrous, slightly viscid | more or less appressed, plump | red-brown, slender | greenish |
| <i>deltoides</i> | glabrous, not ridged | very long, sticky-resinous, pointed, brownish | not fragrant | usually yellow, crooked and distorted | upper bark orange |
| <i>candicans*</i> | terete, glabrous | " | fragrant | red-brown, not so distorted | |
| <i>nigra</i> | glabrous, terete | elongated, viscid, red-brown, curving out at apex | not fragrant, curving out at apex | orange to ash-gray | |

The Genus Prunus is recognized thus

SUMMER : leaves alternate, serrate, stipulate; flowers solitary, fascicled, or in racemes, floral parts in 5's, perfect, usually white or pink or red, with numerous stamens and one pistil; fruit a one-seeded drupe.

WINTER : trees or shrubs having a characteristic bark with long, prominent lenticels, usually almond flavored; twigs slender or moderate, rounded or angled from the nodes, pith continuous; leaf scars alternate, small, half-round or half-elliptical, with 3 minute bundle traces subtended by stipule scars or by the remains of the stipules; buds usually collaterally multiple or occasionally solitary, slender ovoid, sessile, with about 6 exposed scales; end-bud sometimes lacking; leaf scars raised on a cushion.

Key to Sub-Genera

| Group | terminal bud | axillary | leaves | flowers and fruit | fruit | fruit stone | buds |
|-------------------------|--------------------|-----------------------------|--|---|---|--------------------------|-------------------|
| I plums | lacking, scar left | solitary | rolled in bud | few, in umbels, with the leaves from winter-buds | glabrous and glaucous, grooved lengthwise | compressed, not furrowed | longer than broad |
| II apricots | " | " | finely serrate, rolled in the bud | sessile, solitary or in pairs, before leaves, short-stalked | pubescent, pedicel separating at or before maturity | smooth, margin grooved | broad |
| III almonds and peaches | present | 3, lateral ones flower buds | folded in bud, petiole usually glandular | sessile, rarely stalked, solitary | very pubescent, pedicel separating at maturity | furrowed and pitted | round ovoid |
| IV umbellate cherries | " | " | " | in umbels or solitary, with the leaves from winter buds | glabrous, small, globular | globular, not furrowed | |
| V racemose cherries | " | " | " | terminal racemes elongated, with the leaves, flowers small, white | glabrous, small, globular, peduncle usually leafy | " | |

Summer and Winter Keys combined

PLUMS

| species | leaves | veins | under side of leaves | fruit | buds | twigs | foliage | petiole | terminal bud |
|---------------------|------------------------------|---------------------------|------------------------|----------------------------|------------------------|-----------------------------|-------------|----------------|--------------|
| domestica | broad, net-veined, spreading | numerous, at a wide angle | pubescent | elliptical, blue-black | pubescent, light brown | cent. | | without glands | lacking |
| cerasifera | " | " | glabrous except midrib | yellow or red, cherry-like | velvety, acute | glabrous slender, red-brown | green | " | " |
| cerasifera pissardi | broad-ovate, acuminate | " | " | dark wine-red | glabrous | darker than above | dark purple | " | " |

ALMONDS & PEACHES

| species | fruit | habit | leaves | bud | twigs | stipules | petioles | fruit stone |
|-----------|-----------------------|---------|--|----------|----------------------|---|--------------------|------------------------|
| persica | pubescent at maturity | tree | oblong-lanceolate, glabrous, serrate | hairy | red, glabrous | | glandular | deeply pitted |
| triloba | " | shrubby | broad-ovate, tends to be 3-lobed, deeply serrate, glabrous | glabrous | glabrous, dark brown | persistent or broken above the base, deeply fringed | | with thick, bony shell |
| davidiana | " | tree | ovate-lanceolate, long acuminate, finely sharp-serrate, glabrous | " | glabrous, red-brown | | glands undeveloped | free, small pitted |

UMBELLATE CHERRIES

| species | buds | fruit | foliage | twigs | habit | buds | stipules | bud form | leaves |
|-------------|----------------|--|---|-----------------------------------|-------------------|-------------------------|--|---|---|
| tomentosa | three together | glabrate, red at maturity, almost sessile | tomentose beneath | hairy, very dark brown, tomentose | low, shrubby tree | clustered loosely hairy | persistent or broken above base, bristlelike | loosely scaled, acute | crowded, rugose dull, obovate, or elliptic, unequally serrate |
| glandulosa | " | subglobose, red, glabrous, pedicels about 1/2 in. long | glabrous beneath or slightly puberulous | glabrous, rarely puberulous | shrubby | sessile or stalked | | ovate-oblong to oblong-lanceolate, acute cuneate, crenate-serrate | |
| avium | solitary | glabrous, red, pedicelled | not tomentose | glabrous | tall tree | on short spurs | | ovoid-fusiform, glossy brown | oblong-ovate, acuminate, soft, drooping |
| cerasus | " | " | " | " | " | " | | round, ovoid, dull | ovate, abruptly short-pointed, stiff, spreading |
| subhirtella | | involucre persistent, black, sepals erect or spreading, emarginate | dull, hairy, pubescent on veins | when young | tree | | | | oblong-ovate or short acuminate, doubly serrate, teeth short |

PRUNUS - continued

RACEMOSE CHERRIES

| species | habit | foliage | fruit | bud | twigs | leaves | bark | flowers | calyx |
|---------------|-------|----------|---|---|-------------------------|--|-----------------------|--|---------------------------------|
| pennsylvanica | tree | glabrous | sub-umbellate, red, sour | straw-colored | red, shining slender | oblong-lanceolate finely serrate, often gland-tipped | red-brown to wine-red | erect at 1st petals same length as stamens | deciduous |
| virginiana | " | " | racemes dark red, astringent pit smooth | dull light brown, scales proung | red-brown glabrous | elliptic to obovate, glaucous-cent beneath | grayish | " | deciduous tube glabrous outside |
| padus | " | " | racemes black astringent pit rugose | oblong, brown appressed, smooth | velvety, brown | oval-oblong, soft, serrate, abruptly acuminate, grayed beneath | " | large, spreading or drooping, petals twice length of stamens | deciduous tube pubescent inside |
| serotina | " | " | racemes almost black, astringent | small, glossy, brown scales rather fleshy | glabrous, glossy, brown | lanceolate to oblong-ovate, hard, glossy, callus-serrate | brown | small in long racemes | persistent |

N.B. Prunus padus is very like P. virginiana but has larger flowers on longer pedicels, in racemes which are looser, often drooping, and somewhat leafy. (from L.H. Bailey)

PYRUS COMMUNIS is recognized thus

SUMMER : leaves alternate, simple, toothed but not lobed, petiolate, stipulate, orbicular-ovate to oblong-ovate, subcordate to broad cuneate, crenate-serrulate, glabrous, with a hard and lustrous surface; flowers fairly large, white with brownish stamens, long-pedicelled, nearly glabrous; fruit pyriform, pome, with grit cells.

WINTER : a broad pyramidal tree, the young branchlets glabrous, occasionally ending in spines; twigs moderate, terete, with numerous spurlike fruiting branchlets, lenticels conspicuous, pith swollen beneath them, linear or U-shaped, with three bundle traces and no stipule scars; buds moderate, solitary, sessile, with about 4 mucronate scales more or less keeled above; end-bud sometimes lacking.

PRUNUS - cont'd -- PYRUS

The Genus *QUERCUS* is recognized in

SUMMER : leaves short-petioled, pinnately veined, simple or lobed, margin toothed or rarely entire; staminate flowers in catkins; fruit an acorn; buds multiple at ends of twigs, with many scales, lateral buds generally smaller and solitary; twigs fluted.

| species | fruit | lobes | leaves | bark | fruit | leaf form | buds | acorn | leaf base | leaf surface |
|-----------------|------------------------|----------------------|------------------------------------|---|---|---|--------------------------------------|-------------------------------|---------------------------|------------------------------------|
| marilandica | maturing second season | acute bristly tipped | deep-cut or lobed | deeply furrowed, scaly, inner bark not yellow | | broadly obovate | rusty hairy | scales rusty tomentose | rounded | brown tomentose beneath |
| velutina | " | " | thick, leathery | cut in nearly square plates, inner yellow | | obovate to oblong | hoary tomentose, angular | scales hoary pubescent | cuneate to truncate | pubescent to glabrous beneath |
| ellipsoidalis | " | " | deep-cut or lobed | inner bark yellow | | elliptic | lustrous, glabrous, slightly angular | ellipsoid, solid, brown hairy | truncate to broad cuneate | glabrous beneath, lustrous above |
| coccinea | " | " | deep-cut or lobed thin | inner bark red | | elliptic with 0-shape sinus | not angular, pubescent | | truncate or broad cuneate | " |
| palustris | " | " | " | | | elliptic, sinus and lobe sides parallel | | saucer-shaped | cuneate | " |
| borealis maxima | " | " | " | | | oblong, broad sinus spreading | glabrous except apex | | cuneate | glabrous beneath, dull above |
| phellos | " | " | entire not lobed | | nearly sessile | linear-oblong to lanceolate | | | | glabrate beneath |
| imbricaria | " | " | " margin thickened | firm | peduncle short | oblong | | turbinate | | pubescent beneath |
| bicolor | maturing first season | pointed | sinuate, not lobed | thin, scaly, curling | petiolate, in long sessile or short stalked | obovate, margin sinuate | | | | tomentose beneath |
| muhlenbergii | " | " | not cut or lobed | not scaly curling | | oblong to oblong-lanceolate | | scales free to base | rounded | gray tomentose beneath |
| prinus | " | " | " | | | oblong-obovate, acuminate, mucronate | | | cuneate | white hairy beneath lustrous above |
| prinoides | " | " | teeth obtusish | habit shrubby | sessile | ovate-oblong to oblong | | | cuneate | gray-hairy beneath |
| macrocarpa | " | rounded deep cut | lower half lobed, upper fan-shaped | corky-ridged | | obovate | | fringed | | tomentose beneath |
| alba | " | " | sinuses deep cut, rounded | not corky-ridged | peduncles short | obovate, petioles very short | | | cuneate | glaucous beneath |
| robur | " | " | " | " | peduncles longer | | | | auriculate | " |

The Genus QUERCUS is recognized in

WINTER : twigs moderate, fluted; pith star-shaped in cross section; leaf scars multiple, rather small, half round, slightly elevated, with 10 or 12 scattered bundle traces and small stipule scars; buds solitary or collaterally multiple, sessile, globose, ovoid, or conical, with numerous 5-ranked scales.

| species | twigs | acorn | branch | buds | acorn cup | fruit pedicel | bark | bud scales | nut | bud apex | twig color |
|-----------------|-----------------|---------------------------|--------------|--|---------------------------|----------------------------------|--------------------------------------|-------------------|---------------------|--------------------|---------------------------|
| macrocarpa | thick tomentose | sweet, matures 1st season | corky ridged | 1/8" ellipsoid, pale pubescent all over | fringed at rim | | | | | | gray pubescent |
| bicolor | glabrous | " | shaggy | 1/8", only upper pubescent, conical, slightly grooved | not fringed | 1/4" long pubescent short, stout | thin, scaly curling light gray flaky | | | | |
| prinus | " | " | not shaggy | | " | sessile | habit shrubby | pale margined | oblong, apex pilose | acute or acuminate | |
| prinoides | " | " | | ovoid or conical-ovoid, brown puberulent or glabrous | not fringed | | | " | ovoid | acute | red-brown |
| muhlenbergi | " | " | " | conical, only upper pubescent | " | " | light gray tree form | " | apex downy | acute | |
| alba | " | " | " | 1/8", ovoid, red-brown, terete, glabrous | " | short | " | not pale margined | oblong not hairy | obtuse | gray or purplish glabrous |
| robur | " | " | " | 1/8", stout, ovoid dark brown, slightly angular, lateral buds widely divergent | " | long | dark gray furrowed firm | | | | reddish glabrous |
| imbri-carla | glabrous | bitter matures 2nd season | " | lateral buds widely divergent | " | brown smoothish | | pale margined | | | light brown |
| palustris | glabrous | " | " | 1/8" glabrous lustrous, lateral obtuse, more or less appressed | " | brown or green smoothish | | | obtusate | | |
| phellos | " | " | " | medium small, brown, glabrous very acute | " | | | | hemispherical | | red-brown |
| borealis maxima | " | " | " | 1/8", glabrous lustrous | saucer-shape very flat | | inner whitish | | acute | | |
| ellipsoidalis | " | " | " | 1/8", glabrous, lustrous, pubescent | narrow top-shape | | inner light yellow | | kernel yellow | | |
| marilandica | puberulent | " | " | conical-fusiform rusty, hairy | top-shape | | not yellow | pubescent | acute | | |
| velutina | glabrous | " | " | hoary tomentose, angular, large ovoid | deep saucer or bowl shape | | inner yellow | tomentose | obtusate | | |
| coccinea | " | " | " | upper half pubescent, dark red-brown | broadly top-shape | | inner red | | obtusish | | |

QUERCUS -- Winter Key

The Genus ROBINIA is recognized thus

SUMMER : leaves pinnately compound, alternate, petiolate, stipulate; leaflets opposite, short stalked, with stipule-like appendages (stipels), elliptic; flowers in racemes, pealike; fruit a pod, 2-valved, flat, linear-oblong, with several seeds.

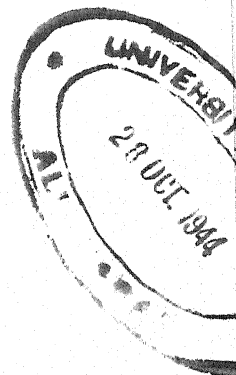
WINTER : trees or shrubs; twigs zigzag, more or less angular, with two prickles at each node, pith round, brownish, continuous; leaf scars alternate, broadly triangular or 3-lobed, with 3 bundle traces; stipules persistent in the form of paired spines; buds small, superposed, covered by a membrane; end-bud lacking.

Summer Key

| species | flowers | branchlets | fruits | leaflets |
|--------------|----------------|----------------------------|-------------|---|
| pseudoacacia | white | glabrous | smooth pods | elliptic or ovate, 7-19 |
| hispida | pink to purple | hispid, sometimes glabrous | | glabrous
less than 15, glabrous,
suborbicular to oval, apex rounded |
| viscosa | " | glandular-viscid | | more than 15, ovate
rachis glandular or viscid |

Winter Key

| species | habit | twigs | thorns |
|--------------|---------|---|----------------------------------|
| hispida | shrubby | very bristly, not viscid
nor glandular | |
| viscosa | tree | densely glandular-viscid | stipular thorns small or lacking |
| pseudoacacia | tree | glabrous, not glandular | 2 stipular prickles at each node |



The Genus *SALIX* is much involved and exceedingly difficult to identify absolutely. But it is possible to know the species in this chart sufficiently to recognize them readily in summer and fairly well in winter. *SALIX* is usually identified by the buds which have one bud scale opening on the inside next to the twig; and by the very flexible (willow) twigs. Leaves alternate, petiolate or sessile, toothed or entire, stipulate; flowers in aments; fruit a 2-valved capsule, formed in spring.

| species | habit | leaves | fruit | number of
stamens | petioles | twigs | flowers | stipules | buds |
|--------------|-------------------------|--|---|----------------------|---|-----------------------------------|---|-----------|---|
| babylonica | decidually
pendulous | lanceolate, finely
serrate, glabrous,
glaucescent beneath | | | not
glandular | olive-
green,
not
bloomy | | | |
| alba | large
tree | lanceolate, serrate,
pubescent beneath | | two | obscurely
glandular | green or
brown | | | |
| vitellina | " " | " | | " | " | bright
yellow | | | |
| nigra | " | linear-lanceolate,
closely serrulate,
glabrous, green both
sides | | 3-5 | not
glandular
slender &
terete | | | | |
| amygdaloides | " | lanceolate, serrate,
glabrous beneath | | " | not
glandular
slender,
terete | | | | |
| incana | often
shrubby | long-linear, revolute,
white tomentose
beneath | | | glandless | villous,
red-brown | before
leaves on
winter
branches | lacking | |
| caprea | " | broad & short, white
tomentose beneath | | | " | red and
green | | prominent | large, red
stout, |
| discolor | " | oblong to obovate,
serrate, acuminate,
cuneate, glaucous | | | " | blackish
with a
red cast | | | large but
more slender,
almost
black |
| pentandra | " | broad ovate to oblong-ovate, smooth, glossy, glandular-serrate, fragrant when bruised, acuminate | lustrous
straw color,
cordate,
base
tapering
gradually | more than
3 | glandular | polished
green | with or
after
leaves, on
short, lateral
leafy
shoots | | |
| lucida | " | ovate-lanceolate, pubescent at first, later glossy, broad & smooth, serrate, long-acuminate glabrous | dull straw-color, base rounded or cuneate, bottle-necked | " | " | duller
green | "
larger | | |

WINTER identification for the Genus SALIX

shrubs or trees; young bark smooth and colorful, green, gray, yellow, or red; twigs very flexible lustrous, slender, terete, with a continuous pith; leaf scars alternate, low, U-shaped, with 3 bundle traces; stipule scars short or wanting; buds mostly small, oblong, appressed, sessile, solitary, with a single scale opening on the inside next the twig.

| species | habit | twigs | twig color | lateral buds | catkins |
|--------------|---|---------------------------------|---|---|--|
| babylonica | tree, pendulous erect tree | slender, whiplike | yellowish | | |
| alba | | slender, flexible, break easily | greenish | appressed, gibbous | |
| vitellina | " | " | bright yellow | " | |
| nigra | " | " | bright red-brown, glabrous or pubescent | " | |
| amygdaloides | " | " | dark orange or red-brown, lustrous | dark brown, gibbous, broad-ovoid, ridged, lustrous | |
| incana | shrubby | slender, dense, very flexible | quite red | red, appressed, gibbous | |
| caprea | ascending | more stout, flexible | green, tinged red | very large, ovoid, stout, scale reddish | |
| discolor | spreading | slender, flexible | brown | large but long and slender, metallic black tinged red | |
| pentandra | tree | " | brownish-green, lustrous, viscid in youth | | small, after the leaves large, with the leaves |
| lucida | shrub or tree not so tall as S. pentandra | " | polished green or yellow-brown | | |

SALIX -- Winter Key

Sassafras variifolium is recognized thus

SUMMER : leaves alternate, simple or 1-3 lobed, entire, 3-veined at the base, distinctively flavored and mucilaginous; branchlets and buds glabrous green and glaucous; flowers dioecious, pale yellow; fruit an ovoid blue drupe on a fleshy carmine pedicel.

WINTER : trees with orange bark and green twigs, freely suckering; aromatic; twigs moderate, with nodes shortened near the tips; pith slightly angled, continuous; leaf scars small, $\frac{1}{2}$ -round or crescent shaped, somewhat raised, with a linear bundle trace which may be broken into 3 and without stipule scars; buds solitary, sessile, ovoid, with about 4 fleshy scales; the end-bud enlarged.

SOPHORA JAPONICA is recognized thus

SUMMER : leaves alternate, pinnately compound, with 7-17 leaflets, petiolate, with small stipules; leaflets opposite, small, ovate, acute, glaucous beneath, slightly stalked; flowers yellowish, pealike, in panicles; fruit an indehiscent pod, terete but constricted between the several seeds; young branchlets green.

WINTER : usually trees; twigs moderate, swollen at the nodes with long internodes, zigzag, angled, green and glabrous; pith triangular, greenish; leaf scars alternate, raised, with an articular membrane which when torn leaves the scars U-shaped, with 3 bundle traces and with stipule scars; buds superposed, sessile, indistinctly scaly, woolly, at first concealed by a membrane; the end-bud lacking; odor strong and offensive when cut or bruised.

The Genus **SORBUS** is recognized thus

SUMMER : leaves alternate, stipulate, pinnately compound or pinnatifid, serrate; flowers small, white, in terminal, compound corymb, white, floral parts in 5's; fruit a small red pome clustered near the tip, $\frac{1}{2}$ -round, little raised, with 3 bundle traces; leaf scars alternate, buds solitary, sessile; lateral buds mostly suppressed, terminal bud rather large, long-ovoid, with about 4 pointed scales.

WINTER : small trees with a smooth bark; twigs moderate with a continuous pith; leaf scars alternate, buds solitary, sessile; lateral buds mostly suppressed, terminal bud rather large, long-ovoid, with about 4 pointed scales.

Summer Key

| species | leaves | leaflets | leaflet tip | fruit |
|-------------|--------------------|--------------------------------|----------------|------------------|
| quercifolia | pinnately cleft | | | |
| americana | pinnately compound | 11-17, lanceolate | long acuminate | orange-red |
| aucuparia | " | 7-15, oval to ovate-lanceolate | acute | darker, deep red |

Winter Key

| species | buds | bundle traces |
|-------------|-------------------|---------------|
| americana | elongated, gummy | five |
| aucuparia | elongated, woolly | five |
| quercifolia | elongated, woolly | three |

SORBUS -- Winter Key

SORBUS -- Summer Key

The Genus *TILIA* is recognized thus

SUMMER : leaves alternate, simple, 2-ranked, slender long-petioled, broadly ovate, oblique at the base, serrate; flowers in drooping cymes from the midrib of a long and narrow leaf-like bract, creamy-white and very fragrant, the source of the finest honey; fruit globose, nut-like.

Summer Key

| species | flowers | leaves | habit | veins | leaf surface | twigs | buds |
|---------------------|--------------------|---|-----------|--|--------------|--------------------------------------|------------------------------|
| <i>americana</i> | with staminodes | essentially glabrous, glossy beneath | | | | glabrous, stout greenish, tinged red | glabrous, stout, dark red |
| <i>heterophylla</i> | " | dense tomentose beneath, often brown | | | | glabrous, moderate, red | glabrous, moderate, deep red |
| <i>tomentosa</i> | " | white tomentose beneath | erect | | | tomentulose | tomentulose |
| <i>petiolaris</i> | " | " | pendulous | | | " | " |
| <i>cordata</i> | without staminodes | glaucous beneath, small | | with axillary hairs, triple veins not pronounced | | glabrous, slender | glabrous, small |
| <i>euchlora</i> | " | glabrous with tufts of hair beneath | | | glossy | glabrous | glabrous |
| <i>europaea</i> | " | glabrous, glaucous with tufts of hair beneath medium size | | | dull | glabrous, numerous slender | glabrous |
| <i>platyphyllos</i> | " | pubescent beneath | | | | loosely hairy | loosely hairy |

Tilia cordata and *Tilia europaea* have conspicuous axillary tufts of hairs at the base of the blade on the under side.

The Genus *TILLIA* is recognized thus

WINTER ; twigs moderate, zigzag, rounded, with rather long internodes; leaf scars alternate, 2-ranked, half-elliptical, a little elevated, with 3 bundle traces which are usually compound, and with unequal stipule scars; buds solitary, sessile, rather largish, lop-sided, ovoid, with 2-3 greenish or red lustrous scales; the end-bud lacking.

Winter Key

| species | twigs | hairiness | habit | shell of fruit | fruit | branchlets | twig color | bark |
|---------------------|----------|---------------------|----------|----------------|----------------|----------------------|---------------------------|---------------------|
| <i>platyphyllos</i> | hairy | loose, sparse | | | | | | |
| <i>tomentosa</i> | " | densely tomentulose | erect | | 5-angled | | | gray streaked black |
| <i>petiolaris</i> | " | " | drooping | | 5-furrowed | | | |
| <i>cordata</i> | glabrous | ---- | | thin, fragile | | slender, very twiggy | | |
| <i>europaea</i> | " | ---- | | thick | subglobose | slender less twiggy | | almost black |
| <i>euchlora</i> | " | ---- | | " | ellipsoidal | " | | |
| <i>heterophylla</i> | " | ---- | | " | ovoid | moderate | blood-red | |
| <i>americana</i> | " | ---- | | " | oblong-obovoid | stout | reddish on the upper side | |

N.B. *Tillia platyphyllos* is included in this key for the sake of distinction but further discussion of it is omitted since it seems less desirable than the others for landscape use. It is occasionally sold as *T. europaea* (*vulgaris*). In its youth it appears very fine, better than *europaea*, dense and shapely. It leafs out early and flourishingly, but in later growth and habit it has many disadvantages such as frost-cracking and sooty deposit plus a serious summer infestation of red spider which quickly yellows the foliage and causes it to drop. For that reason it is better to avoid planting this species.

T. euchlora is rapid in growth and hardy, but it appears to suffer in much the same way as *platyphyllos*; so again we include it in the key only for the sake of identification, but omit much data.

URTICACEAE

1. Fruit a one-seeded samara, winged, in clusters; bark with flattened ridges; leaves usually doubly serrate, with base oblique; winter buds spreading with scales in 2 ranks. Ulmus
2. Fruit a short-stalked drupe; branches never spiny; bark smoothish, scaly; leaves singly serrate, with base symmetrical, subcordate; winter buds spreading with scales in 4 ranks. Zelkova
3. Fruit an oblong, berrylike drupe with a sweetish, date-like flavor; bark light gray with deep, corky ridges; winter buds appressed Celtis

The Genus *ULMUS* is recognized thus

SUMMER : leaves 2-ranked, alternate, simple, thickish, dark green, usually doubly serrate, oblique at the base; twigs slender, zigzag, 2-ranked; leaf scars raised very little, broadly crescent shaped, with 3 bundle traces and unequal stipule scars.

| species | leaves | fruit | flowers | bark of branches | twigs | buds | leaf margin |
|---------------------|-----------------------------------|-----------------------------|--|---------------------------|-----------------------------|---------------------------|----------------|
| <i>racemosa</i> | essentially smooth both sides | hairy all over | in pendulous racemes | often corky | pubescent | large, pillose | doubly serrate |
| <i>glabra</i> | " | glabrous | dense clusters | not corky, smooth | hispid-pubescent | large, hairy, 4 scales | " |
| <i>carpinifolia</i> | as above & lustrous | glabrous | " | " | glabrous | large, minutely pubescent | " |
| <i>americana</i> | rough above, soft pubescent below | hairy around edge | on long slender pedicels, pendulous | rough | glabrous | small, glabrous | " |
| <i>fulva</i> | scabrous both sides | hairy only over seed | short pedicelled, in dense clusters | rough, occasionally corky | rough hairy | large, rusty tomentose | " |
| <i>procera</i> | rough both sides | glabrous | short pedicelled, in dense clusters, not pendulous | rough, occasionally corky | glabrescent | large, pubescent | " |
| <i>pumila</i> | glabrous, glabrous, obovate | glabrous, obliquely obovate | very short stalked | corky smooth | slightly pubescent, slender | tiny, hairy with 4 scales | singly serrate |

The Genus *ULMUS* is recognized thus

WINTER : twigs slender, terete, zigzag; 2-ranked in one plane; pith small, rounded, continuous; buds solitary, 2-ranked, ovoid, obliquely sessile; bud-scales obtuse; leaf scars scarcely raised, broadly crescent-shaped, with 3 bundle traces and unequal stipule scars.

N.B. usually the twig in winter and the leaf in summer are sufficient identification.

Winter Key

| species | inner bark | buds | bark structure | twigs | branchlets | bud size | bud scales | roots |
|---------------------|------------------|----------------------------|---------------------|------------------|--|---------------|--------------|---------------|
| <i>fulva</i> | mucilaginous | brown tomentose | red all through | scabrous | | | | |
| <i>americana</i> | not mucilaginous | pale pubescent or glabrous | with white layers | glabrous | | | | |
| <i>racemosa</i> | " | large, pilose | uniform all through | corky, pubescent | | | | |
| <i>carpinifolia</i> | " | large, more or less hairy | " | not corky | glabrous | | | |
| <i>pumila</i> | " | very small, scales ciliate | " | " | slightly pubescent | tiny, oblique | four visible | |
| <i>glabra</i> | " | large, blackish-red | " | " | hairy while young | large | four visible | not suckering |
| <i>procera</i> | " | " | " | " | pubescent, occasionally with corky wings | large | four or more | sucker-ing |

KEY TO THE SHRUBS IN WINTER

- A. leaf scars whorled (three at a node) or opposite.
 - Pith small, angular; buds in depressed pockets, indistinctly scaly; stipule scars evident Cephalanthus
 - Pith large, roundish; buds not in depressed pockets and with distinct scales; without stipule scars Hydrangea
 - Pith brown, excavated Deutzia
- AA. Leaf scars opposite (two at a node).
 - Branchlets and twigs densely clothed with silvery or brown scales.
 - Shepherdia
 - Branchlets and twigs not clothed with scales.
 - Twigs spinescent Rhamnus
 - Twigs not spinescent.
 - Branchlets enlarged at the nodes and flattened; buds superposed in a single-budlike aggregate; leaf-scar horseshoe shaped; parts aromatic when bruised Calycanthus
 - Nodes not especially enlarged nor flattened.
 - Buds naked or with a single scale or a sac of two closely united scales, short, fat, and gummy within Viburnum
 - Buds with several scales.
 - b. Buds stalked.
 - Lateral buds often concealed by a persistent petiole base; buds oblong and stalked; leaf scars connected by a concave line Cornus
 - Lateral buds evident though small; leaf scars meeting or almost so, though not connected Viburnum
 - bb. buds sessile.
 - c. outer bark freely peeling.
 - Twigs and buds densely rusty-tomentose Hydrangea
 - Twigs and buds not rusty-tomentose.
 - Young growth orange-colored; buds concealed under a membrane Philadelphus
 - Not orange-colored and buds not concealed.
 - Buds sometimes superposed.
 - Leaf scars on the tips of raised bases Lonicera
 - Leaf scars not or slightly raised Viburnum
 - Buds not superposed.
 - Twigs very hairy; buds gray-velvety Kolkwitzia
 - Twigs and buds glabrous or glabrescent.
 - Pith spongy or excavated Deutzia
 - Pith continuous Viburnum
 - cc. outer bark firm
 - d. leaf scars with three bundle traces.
 - e. scars large and broad.
 - Twigs stout, terete; buds solitary; end-bud enlarged Aesculus
 - Twigs angled and with a very large, soft pith; scars sometimes with 5-7 bundle traces; buds multiple Sambucus
 - ee. scars moderate or small.
 - Leaf scars hairy at the top Rhodotypos
 - Leaf scars not hairy at the top.
 - Twigs with 2-4 hairy, raised lines Weigela
 - Twigs without hairy, raised lines.
 - f. Twigs green.
 - Twigs bright green; buds silvery silky-hairy Laburnum
 - Twigs olive-green, lustrous; buds glabrous, with few scales; end-bud lacking; fruit an inflated bladderlike pod Staphylea
 - ff. Twigs not green.
 - Twigs relatively coarse, with a large pith Hydrangea

- Twigs and pith moderate.
 - Leaf scars frequently alternate, half-elliptical or crescent-shaped Rhamnus
 - Leaf scars always opposite.
 - Buds more or less appressed Viburnum
 - Buds not appressed.
 - Leaf scars on the narrowed ends of raised bases; buds at a very broad angle with the twig Lonicera
 - Leaf scars only slightly raised; angle of bud acute Deutzia
- dd. Leaf scars with only one bundle trace, or with many traces scattered or in an ellipse or nearly confluent in a line (includes cases where the traces are indistinguishable in a shrivelled scar)
 - g. soft, pithy half-shrubs with superposed buds.
 - Scars triangular or crescent-shaped Buddleia
 - Scars and bundle-traces C-shaped Callicarpa
 - gg. not as above.
 - h. Pith finally chambered or excavated.
 - Twigs distinctly ridged or winged Euonymus
 - Twigs not distinctly ridged or winged.
 - Buds slender, moderate, finally multiple; twigs yellow-buff Forsythia
 - Buds small.
 - Leaf scars small, ragged, raised, and shrivelled Symphoricarpus
 - Leaf scars moderate, distinct, low and diamond-shaped; twigs angled below the nodes Hypericum
 - hh. Pith continuous and persistent.
 - Twigs angular or grooved below the nodes.
 - i. leaf scars relatively broad.
 - Buds superposed, scales stiff-pointed.
 - Chionanthus
 - Buds not superposed, scales not stiff-pointed Syringa
 - ii. Leaf scars small or minute, elevated.
 - scars shrivelled Symphoricarpus
 - Twigs terete; scars small, elevated, distinctly outlined and without stipule scars . Ligustrum
- AAA. Leaf scars alternate (one at a node)
 - j. stems with twig spines.
 - k. densely clothed with silvery or brown scales.
 - End-bud often present, twigs moderate; buds with about four exposed scales; thorns lateral Elaeagnus
 - End-bud lacking; twigs slender, ending in spines; buds with two exposed scales Hippophae
 - kk. Not clothed with scales.
 - Twigs puberulent, green or brownish; buds solitary . . . Ceanothus
 - Twigs glabrous; buds small.
 - Twigs whitish or short striate, 5-angled; buds inconspicuously multiple; habit scrambling Lycium
 - Twigs orange or reddish, rigid; buds becoming conspicuously multiple; twig spines axillary Cydonia
 - jj. stems with prickles (superficial outgrowths)
 - l. Prickles below the nodes or scars.
 - m. Twigs grooved or furrowed.
 - With branched or slender leaf-spines and fascioled leaves or scars Berberis
 - Buds developing a green grooved spine and stipules . . Genista
 - mm. Twigs not grooved or furrowed.
 - n. Twigs with 1-3 prickles below each narrow leaf scar.
 - Twigs light-colored, moderate; bundle-traces 5; buds sessile with about 3 exposed scales Acanthopanax
 - Twigs darker; bundle traces 3; buds with several loose scales Ribes

- nn. Twigs with numerous stout, curved thorns below the nodes;
twigs very coarse *Aralia*
- ll. Prickles scattered (not all at the nodes).
Young twigs angular or ridged, and with paired stipular
thorns *Robinia*
- Twigs terete; prickles slender or recurved *Rosa*
- lll. Prickles beside the bud (stipules)
Twigs and buds pungently aromatic; buds rusty-red . . . *Zanthoxylum*
Not pungently aromatic (or at least only the stipules so).
Paired prickles becoming coarse and strong; twigs strongly
ridged near the tip and colored orange and green; buds
superposed beneath a membrane *Robinia*
- Paired prickles small, remaining weaker.
Twigs green, with 3 decurrent ridges beneath the leaf-scars
Caragana
- Twigs not green nor with decurrent ridges; leaf scars torn
and shrivelled on much raised petiole bases; leaf bases
not overlapping *Rubus*
- jjj. Without prickles or spines (unarmed).
Densely clothed with silvery or brown scales; buds with 4 exposed
scales *Elaeagnus*
- Not as above.
Twigs terete, fluted near the tip and terminating in a dilated
flattened tip with several bud and fruit scars *Hibiscus*
- Twigs not fluted near the tip nor terminating in fruit scars.
k'. Buds naked.
Fruit a 2-celled woody capsule *Hamamelis*
Fruit a small drupe *Rhamnus*
- kk'. Buds not naked.
Stems brownish-yellow overcast with a leaden color near
the tips; buds a little elongated, pointed, and loose.
Clethra
- Stems not as above.
o. Stems and buds spicily and pungently aromatic.
Buds rather small, superposed, the upper flower-
buds collaterally doubled and stalked *Benzoin*
Buds not superposed nor multiple.
- p. Young twigs resinous-dotted.
With stipule scars *Comptonia*
(see *Myrica* key)
- Without stipule scars *Myrica*
- pp. Young twigs not resinous-dotted; coarse
or else hairy or glaucous *Rhus*
- oo. Not aromatic.
q. Twigs, stems, and branches green.
With a narrow scar completely encircling the
twig at each node *Magnolia*
- Without such scar.
r. stems definitely and positively ridged.
Buds small, encased in hardened greenish
resin; ridges about eight *Baccharis*
- Buds not resinous; branches smooth.
Scars with 3 bundle traces; pith rela-
tively large *Kerria*
- Scars with one indistinct bundle trace;
pith small.
Some buds producing a green,
grooved spine *Genista*
- Buds not becoming spines *Cytisus*
- rr. Stems not positively ridged.
Buds with a single scale opening on the
inside next the twig *Salix*
- Buds with more than one scale, more or
less stalked *Cornus*
- qq. Twigs and stems not green
s. bark freely peeling.
Twigs roughened by lenticels and longitudinal
fissures; bundle traces 3; inner bark
reddish *Exochorda*

- Twigs not roughened as above.
 Bundle traces 5; inner bark bright orange. *Physocarpus*
- Bundle traces 3; buds stalked; leaf scars narrow;
 pith spongy *Ribes*
- ss. Not freely peeling.
 Twigs enlarged upwards through the season's
 growth; leaf scars scalloped and almost
 encircling the bud *Dirca*
- Twigs not enlarged upwards.
 t. Buds red, elongated; twigs grayish.
 Bud scales more or less twisted . . . *Amelanchier*
- tt. Buds not red.
 Bud scales not twisted *Aronia*
- Bud scales keeled and mucronate . . . *Photinia*
 (sometimes tinged red)
- Bud scales not keeled nor mucronate.
 Leaf scars essentially lacking; buds
 multiple; twigs fine and very dark. *Tamarix*
- Ordinary leaf scars present.
- u. Bundle traces one.
 Buds superposed.
 Leaf scars much raised, with one
 or 3 bundle traces and with per-
 sistent stipules; fruit an
 inflated pod *Colutea*
- Leaf scars more or less raised,
 with 1 bundle trace and with
 minute stipule scars; fruit
 a persistent, berrylike drupe. *Ilex*
- Buds solitary or occasionally
 collaterally multiple.
- v. Bud scales two.
 Scales ciliate; no stipule
 scars *Nemopanthus*
- Not ciliate, usually parted
 and exposing the hairy
 interior; stipule rather
 persistent, leaving narrow
 indistinct scars . . . *Cotoneaster*
- vv. Bud scales more than two.
 Buds globose to spindle-shaped
 (thickest at the middle) and
 with about 6 exposed scales. *Spiraea*
- Buds ovoid and with fewer scales.
 End-bud present, root deep red;
 bud scales indistinct,
 glabrate, stipular; stipule
 scars small *Ceanothus*
- End-bud lacking or deciduous.
 Seeds solitary in each fruit-
 cell; young branches with
 resinous dots . . . *Gaylussacia*
- Seeds several in each cell;
 young branches not resinous. *Vaccinium*
- uu. Bundle traces 3 or more.
 Buds at first under a membrane, closely
 superposed in pairs, silky-hairy;
 scar finally U-shaped *Ptelea*
- Buds never concealed by a membrane.
 Twigs more or less 3-sided; buds
 rather large, usually stalked, and
 with 3 sub-valvate scales . . . *Alnus*
- Twigs and buds not as above.
 w. Buds superposed.

Stipule scars relatively large;
pith pale or light brown.

Stephenandra.

Stipule scars small; pith white.

Amorpha

ww. Buds solitary or collaterally
multiple.

Leaf scars relatively large; buds
with about 4 exposed scales.

Sorbaria

Leaf scars relatively small; buds
with fewer or more scales.

x. Leaf scars 2-ranked.

Twigs slender; buds with
2-3 exposed scales . .

Betula

Twigs moderate; buds with
4-6 exposed scales . .

Corylus

xx. Leaf scars not 2-ranked.

Buds clustered near the tip
and with numerous 5-ranked
scales; bundle traces

numerous Quercus

Buds not a above.

Bundle traces 3, minute

Prunus

Bundle traces 3, large

Xanthoceras

KEY TO THE DECIDUOUS SHRUBS WHEN IN FOLIAGE

- A. Leaves opposite or whorled
 - Branches and under side of leaves densely clothed with silvery or brown scales *Shepherdia*
 - Not clothed with silvery or brown scales
 - B. Leaves compound
 - Leaves palmate
 - with 3 leaflets; flowers yellow, in drooping racemes; twigs green *Laburnum*
 - with 5-7 leaflets; flowers in large, erect clusters; fruit a 3-valved pod *Aesculus*
 - Leaves pinnate
 - with 3 leaflets
 - leaves all compound; flowers in racemes after the leaves *Staphylea*
 - leaves chiefly simple; flowers yellow, not in racemes, before or with the leaves *Forsythia*
 - with 5-9 leaflets; pith large *Sambucus*
- BB. Leaves simple
 - C. Leaf margin entire, neither toothed nor lobed
 - leaves more or less punctate with pellucid dots; flowers bright yellow in summer; floral parts in 5's; fruit a dry, dehiscent capsule *Hypericum*
 - leaves not punctate; flowers not yellow; fruit not dehiscent.
 - twigs ending in a short spine between the upper-most buds *Rhamnus*
 - twigs not spinescent
 - D. Petioles short
 - Nodes of stem flattened, parts aromatic when bruised *Calycanthus*
 - Nodes not flattened, parts not aromatic
 - Leaves glabrous, glaucous below, often lobed on vigorous shoots; flowers small, pinkish bells *Symphoricarpus*
 - not as above; leaves more or less hairy or glabrous, not glaucous nor lobed
 - Leaves firm and lustrous; branches greenish; fruit a drupe in panicles *Ligustrum*
 - Leaves soft and dull, bluish or hairy; branches brown; fruit a berry in axillary pairs *Lonicera*
 - DD. Petioles medium or long
 - leaves with stipules, often 3 at a node; flowers and fruits in dense globular heads *Cephalanthus*
 - Without stipules; flowers and fruits not in globular heads
 - Twigs squarish, especially at the nodes, gray; buds with stiff, keeled scales *Chionanthus*
 - Twigs terete
 - Twigs slender and bright-colored; buds small or slender; terminal bud present; leaves with anastomosing veins, more or less pubescent *Cornus*
 - Twigs less slender, tan-colored; end-buds usually lacking; leaves glabrous or glaucous or whitened beneath or finely dotted; flowers tubular in terminal pyramidal panicles *Syringa*
 - CC. Leaf margin toothed or lobed
 - Twigs with 2-4 hairy, raised lines; fruit a 2-valved capsule *Weigela*

Twigs not as above
 Twigs yellowish or greenish, ridged, pithy, glabrous; leaves lanceolate to ovate, slightly fleshy Forsythia
 Twigs not as above
 e. leaves distinctly lobed

ERRATUM

Page 46. Insert between lines 11 and 12: "The leaves not lobed."

Twigs densely brown tomentose near the tip . . . Hydrangea
 Twigs not brown tomentose
 Fruit a winged samara; leaves regularly palmately lobed; buds with several overlapping scales . . . Acer
 Fruit a drupe; buds naked or with two scales which meet but do not overlap Viburnum
 leaves very short-stalked; flowers and fruits in axillary cymes Callicarpa
 Leaf petioles short or moderate; flowers and fruits not in axillary cymes
 f. twigs green, angled or ridged
 Soft, pithy, half shrubs; flowers lavender in terminal clusters Buddleia
 Not as above; flowers in stalked, axillary clusters Euonymus
 ff. Twigs not green
 Twigs ridged or winged Euonymus
 Twigs not ridged or winged
 Twigs very hairy, gray Kolkwitzia
 Twigs not so hairy, brown
 Leaf scars ciliate; flowers solitary; fruit a black drupe in terminal clusters of four
 Rhodotypos
 Not as above

g. all flowers fertile
 Branchlets hollow; bark dark brown; peeling; flower clusters axillary; flowers with 5 petals; fruit indehiscent Deutzia
 With solid white pith; bark orange to orange-brown
 Flowers and fruit sub-paniculate, terminal; flowers with 4 petals; fruit dehiscent in 4 valves; leaves 3-5 nerved at the base, remotely toothed; veins impressed . . Philadelphus
 Flowers of 2 kinds - fertile and sterile; leaves serrate
 Leaves serrate; fruit a capsule; flowers & fruits in terminal corymbs Hydrangea
 Leaves dentate; fruit a drupe; flowers and fruits in cymes . . Viburnum

AA. Leaves alternate
 Leaves minute and scale-like Tamarix
 Leaves not minute nor scale-like
 h. Leaves compound
 Leaves palmate
 Leaves 5-parted, armed Acanthopanax
 Leaves 3-parted, not armed Ptelea
 Leaves pinnate
 i. Plant aromatic when bruised
 without spines or prickles Rhus
 with spines or prickles
 young leaves glandular, sweetly fragrant and stipulate; prickles strong, hooked, mixed with bristles Rosa
 All parts pungently aromatic; leaves pellucid-dotted; estipulate; prickles in pairs at the nodes Zanthoxylum

- ii. Not pungently aromatic
 - j. with thorns or prickles
 - branchlets very coarse and with a large pith, armed with very broad, stout prickles; leaves doubly compound, estipulate, prickly on the upper side
Aralia
 - branchlets moderate; pith moderate or small; leaves singly compound and with stipules
Leaves without a terminal leaflet; leaflets obtuse at the tip; stipules often persisting as slender prickles Caragana
 - Leaves with a terminal leaflet, acute at the tip
Prickles stipular, paired at the nodes . . . Robinia
 - Prickles numerous, not limited to the nodes.
Twigs angular, short-lived; leaves toothed and petioled; pistils borne on a convex receptacle Rubus
 - Twigs terete, normal; leaves with dilated stipule-bearing petioles; pistils enclosed in an urn-shaped receptacle . . Rosa
 - jj. without thorns or prickles, leaflets more than three
 - Margin toothed
Flowers small in panicles; fruit a follicle . . Sorbaria
 - Flowers moderate in racemes; petals clawed; fruit a 3-valved capsule with thick walls . Xanthoceras
 - Margin entire
Bark fibrous or flaky; flowers in axillary racemes; fruits inflated, with papery walls; leaves not glandular Colutea
 - Bark not fibrous nor flaky; flowers in terminal spikes; fruits tiny, glandular, bean-like pods; leaves punctured with glands . . . Amorpha
- hh. leaves simple
 - k. leaves lobed
 - l. petioles with stipules
Leaves and buds 2-ranked; twigs slender, zigzag; flowers small, white Stephanandra
 - Not 2-ranked; twigs coarse, bark peeling; flowers large, pink Rubus
 - ll. Petioles without stipules
Bark freely peeling; leaf 3-lobed . . . Physocarpus
 - Bark firm
Twigs terminated with numerous, flat, round flower and fruit scars; habit erect; leaves wedge-shaped at base, lobing poorly defined, only the upper half toothed Hibiscus
 - Twigs not so terminated with scars; habit arching or tangled
Leaves slightly 3-5 lobed, dark green above, pale beneath, not glandular Spirea
 - Leaves distinctly palmately lobed, bright green both sides, glandular beneath Ribes
- kk. Leaves toothed but not lobed
 - m. Having thorns or prickles
Leaves clustered on short spurs Berberis
 - Leaves not clustered on spurs
Thorns terminal Rhamnus
 - Thorns lateral; leaves with large stipules, thick and glossy Cydonia
 - mm. Without thorns or prickles.
 - n. Flowers and fruits in catkins .
Bark in papery layers with long transverse lenticels; fruit a minute nut with membranous wings Betula
 - Bark not as above

- buds covered by a single scale, twigs very flexible Salix
- buds with more than one scale, twigs less flexible. Fruit a nut enclosed by a leafy involucre Corylus
- Fruit not in an involucre, but forming cones Alnus
- nn. flowers and fruits not in catkins.
 - o. Plant aromatic when bruised.
 - Leaves very narrow and long, - pinnatifid, fernlike (See species for Myrica) Comptonia
 - Leaves short, toothed near the tip or entire, fruits covered with a whitish resin Myrica
 - oo. Plant not especially aromatic.
 - p. twigs green, angular.
 - Leaves narrow-ovate, thin, sharply toothed, flowers yellow Kerria
 - Leaves obovate, somewhat thick, palmate or 3-nerved; fruit with a conspicuous white pappus Baccharis
 - pp. Twigs not typically green (or at least tinged red).
 - Leaves with resinous dots beneath Gaylussacia
 - Leaves not resinous-dotted .
 - Leaves typically with 3 main veins; root-stalk red, very large Ceanothus
 - Leaves with only one main vein; root-stalk not red .
 - Petioles of leaves usually glandular Prunus
 - Not glandular
 - Leaves mucronate at the tip; margin obscurely serrate; fruit on long pedicels. Nemopanthus
 - Not as above
 - Leaves glaucous, toothed near tip; fruit 5-lobed; bark reddish Exochorda
 - Not as above
 - Fruit an acorn; leaves oblong, without stipules, obscurely toothed, gray-tomentulose beneath Quercus
 - Not as above
 - q. Fruit a berry, drupe, or pome
 - r. Flowers in racemes
 - Racemes drooping, axillary; leaves oval to obovate Amelanchier
 - rr. flowers not in racemes
 - Flowers solitary in the leaf axils; fruit a drupe; leaves singly serrate, with slightly impressed veins, pith green Ilex
 - Flowers not solitary, in short corymbs or cymes.
 - Fruit hollow & open at top; a tall shrub or small tree Photinia
 - Fruit closed & pointed at top.
 - Leaves with small black glands along the midrib Aronia
 - Without such glands Rhamnus
 - qq. Fruit a capsule or follicle.
 - Flowers in umbel-like racemes, corymbs or panicles, glabrous or pubescent; fruit of five follicles Spirea
 - Flowers in terminal, slender, erect racemes or spikes, pubescence stellate, capsule splitting into 3 valves Clethra

kkk. leaf margin entire

s. leaves and twigs clothed with silvery or brown scales.

Twigs with terminal thorns; leaves very slender;
fruit bright orange; twigs with brown
scales near the tip Hippophae

Twigs with lateral spines or none; leaves less
slender; fruit dry, yellow to pink; twigs with
brown scales Elaeagnus

ss. not clothed with silvery or brown scales

t. having thorns or prickles

Leaves in fascicles on short axillary spurs; habit
shrubby; leaves rather small, oval and
short-petioled Berberis

Leaves often fascicled, slender, but not on spurs,
and with long stipules; twigs yellowish; habit
scrambling; leaves moderately small, lanceolate,
cuneate, subsessile Lycium

tt. without thorns or prickles

Twigs enlarged upwards through the season's
growth; leaf petioles enclosing and conceal-
ing the bud Dirca

Twigs not thus enlarged; buds evident.

u. parts aromatic when bruised

Leaves large, oblong, bright green; twigs
lustrous Benzoin

Leaves moderate, oval, glaucous; twigs glaucous
Cotinus (see Rhus)

uu. not especially aromatic

Leaves rather large, lop-sided, and with
a sinuate margin Hamamelis
Leaves symmetrical

v. buds enclosed by a single scale

Buds large, bearing a petiole-scar
above the base; twigs encircled
by a narrow scar at the nodes Magnolia

Buds small or moderate, appressed;
petiole scar below the base of
the bud; twigs very flexible, not
encircled by a scar at the nodes Salix

vv. buds with several scales

w. branchlets green, striped; leaves
small, often ternate

Branches spineless; seeds with a callous
appendage Cytisus

Branches often spiny; seeds with-
out callous appendage Genista

ww. Branchlets not green or at least tinged red

Leaves with awl-shaped stipules, ovate
to oval, lustrous dark green Cotoneaster

Leaves without such stipules.

Leaves resinous-dotted; fruit berry-
like, with ten 1-seeded nutlets

Gaylussacia

Leaves not resinous-dotted.

Fruit a many-seeded berry Vaccinium

Fruit a leathery or fleshy

1-seeded drupe; flowers before

the leaves on old wood Daphne

ACANTHOPANAX SIEBOLDIANUS may be recognized thus

SUMMER : a shrub, sparingly branched and prickly; leaves alternate, partly fascicled on short spurs, oblong-obovate, petioled, estipulate, palmately divided with 5-7 leaflets, the latter obovate to fruit a 2-5 seeded black berry, seldom seen under cultivation.

WINTER : branches moderate, yellowish, somewhat lenticular, armed with 1-3 prickles beneath each leaf scar, often with short spurs or spur-like branchlets; leaf scars alternate, narrow, crescent- or U-shaped, slightly raised, with 5 small bundle traces and no stipule scars; buds alternate, solitary, sessile, conical-ovoid, with about 3 thin scales evident.

The Genus AMORPHA may be distinguished thus

SUMMER : leaves alternate, pinnately compound, marked with minute dots; leaflets small, entire, with soon falling, awl-shaped stipules; flowers purple or blue, pealike, in terminal spikes, erect, on the back.

WINTER : shrub with slender, yellow-gray twigs, very slightly angled; pith white, continuous; leaf scars alternate, slightly curved, low, triangular, with 3 bundle traces and with small stipule scars at the outer corners; buds small, superposed, nearly globose, projecting at a narrow angle from the twig, with 2-3 exposed scales.

Summer Key

| species | habit | leaflets | pubescence | calyx | flowers | fruit |
|-----------|------------|---|-----------------|-------------------------------------|---------|--------|
| fruticosa | tall shrub | lowest pair $\frac{1}{2}$ " or more from stem | sparse | lower lobes acute | purple | curved |
| canescens | low shrub | lowest pair close to stem | dense & whitish | lobes $\frac{1}{2}$ as long as tube | blue | --- |

Winter Key

| species | buds | twigs | stipule scars | leaflets | color |
|-----------|------------|--------------|---------------|---------------------|------------|
| fruticosa | superposed | glabrate | evident | moderate, scattered | blue-green |
| canescens | solitary | white-woolly | minute | small, crowded | lead-gray |

ARALIA SPINOSA is recognized thus

SUMMER : branchlets very thick with stout cortical prickles; leaves alternate, very large, petiolate, veins curving before reaching the margin; stipulate; leaflets distinctly stalked, with the flowers small, whitish, in large pubescent panicles; base of the petiole clasping the stem to $\frac{1}{2}$ or more; tened stones, less persistent than the red-violet pedicels.

WINTER : large shrub or small tree, much suckering, with numerous strong prickles; twigs thick, terete, with a large pith, glabrous; leaf scars alternate, U-shaped, low, $\frac{1}{2}$ -encircling the twigs, with 5 bundle traces and no stipule scars; buds ovoid-conical, solitary, sessile, with few scales, comparatively small.

ACANTHOPANAX

AMORPHA

ARALIA

The Genus ARONIA may be distinguished thus

SUMMER : leaves elliptic or oblong to obovate, with minute black dots or glands along the midrib on the upper side; flowers white or marked pink, in small corymbs, with reddish anthers; fruit a small pome with persistent calyx lobes.

WINTER : twigs brown, glabrous, or pubescent, moderate, terete; leaf scars alternate, low, U-shaped, with 3 bundle traces and no stipule scars; buds solitary, sessile, appressed, usually red and elongated-oblong, with about 5 pointed and somewhat glandular-denticulate scales.

Summer Key

| species | under side of leaves | branchlets | fruit |
|-------------|-----------------------|------------|-------|
| arbutifolia | pubescent | tomentose | red |
| melanocarpa | glabrous or nearly so | glabrous | black |

Winter Key

| species | twigs and buds | under side of leaves | fruits |
|-------------|-----------------------|----------------------|--------|
| arbutifolia | hairy | rather woolly | red |
| melanocarpa | glabrous or nearly so | glabrous | black |

BACCHARIS HALIMIFOLIA is recognized thus

Summer : an unarmed shrub; leaves alternate, moderate sized, simple, toothed but not lobed, petiolate, obovate, thickish, with 3 main veins from the base, cuneate, resinous; flowers and fruits in small heads, these in terminal panicles or corymbs; fruit an achene, ribbed and somewhat compressed, with a white pappus of long, bristly hairs.

WINTER : twigs green, angular or ridged, with a small, continuous pith, resinous but not aromatic; leaf scars alternate, small, broadly v-shaped, slightly raised, decurrent in ridges from the angles, with 3 bundle traces and no stipule scars; buds small, oval or globose, with about 4 scales, encased in a hardened, greenish resin.

BENZOID AESTIVALE is recognized thus

SUMMER : shrub with all parts aromatic; leaves alternate, simple, entire, oblong-obovate, with one main vein, acute, cuneate, glabrous, short-petioled; buds evident, with 2-3 outer, pale-toned scales; flowers pale honey-yellow, fragrant, in subsessile, axillary clusters; fruit an oblong-obovate scarlet drupe.

WINTER : spicily-aromatic when bruised or broken; twigs lustrous olive-green to brownish-green with pale lenticels; leaf scars alternate, small, crescent shaped or half-round, slightly raised, with 3 bundle traces, often confluent, and no stipule scars; buds smallish, superposed, the upper flower buds collaterally doubled and stalked, the leaf buds with about three exposed scales; end-bud lacking.

ARONIA -- BACCHARIS -- BENZOID

87945

The Genus *BERBERIS* is recognized in

SUMMER : leaves alternate, often fascicled on short axillary spurs, simple, often entire; inner bark and wood yellow; flowers yellow, axillary; fruit a several-seeded berry.

WINTER : shrubs with spines at the base of very short spurs; wood and inner bark yellow; twigs grooved or furrowed, slender; leaf scars half-round, with 3 minute, often indistinct bundle traces and no stipule scars.

| species | habit | flowers and branches | leaves | branchlets | spines |
|---|---------------|---------------------------------|--|------------------|----------|
| <i>buxifolia</i> | sub-evergreen | solitary | entire | | present |
| <i>darwini</i> | " | racemes longer than leaves | dentate, green | | " |
| <i>Mahoberberis neuberti</i> | " | unarmed, glabrous | not fascicled, often pinnately 3-foliolate | glabrous | unarmed |
| <i>Mahoberberis latifolia mentorensis</i> | " | racemes shorter than leaves | dentate, glaucous, blue-green | pubescent, spiny | unarmed |
| <i>vulgaris</i> | " | glabrous fascicled | not fascicled thicker than B. thunbergi | glabrous | branched |
| <i>wilsonae</i> | deciduous | racemes | | | 3-parted |
| <i>thunbergi</i> | " | fascicles, 2-6, short-stalked | | puberulous | " |
| | " | fascicles, 2-6, slender stalked | red-green (varieties red) | glabrous | simple |

N.B. *B. sargentiana* and *B. julianae* have glabrous branchlets and are evergreen.

BUDDLEIA DAVIDI may be recognized thus

SUMMER : semi-woody shrubs; leaves opposite, simple, short-petioled, serrate, glabrous above and white tomentose beneath; flowers violet or red-violet, tubular, with the stamens inserted above the middle of the tube, in long, slender panicles; fruit an oblong, pointed capsule.

WINTER : unarmed shrubs; twigs semi-woody, pithy; glabrous or puberulous, square, green to yellowish or straw-colored; leaf scars opposite, small, low, triangular or crescent-shaped, with one bundle trace and with stipule scars transversely connected; buds oblong, sessile, sometimes superposed, with two outer scales.

CALLICARPA AMERICANA is recognized thus

SUMMER : leaves opposite, pubescent above, tomentose beneath, elliptic-ovate, acuminate, cuneate, crenate-serrate, with fairly long petioles; inflorescence subsessile; flowers small, in axillary cymes; fruit a small, violet drupe, subglobose, with 2-4 stones.

WINTER : a soft-wooded shrub; twigs dingy yellowish, round or slightly 4-angled, persistently scurfy with stellate hairs, slender, and with a comparatively large pith; leaf scars opposite or almost so, in 4 ranks, broadly crescent shaped, with one bundle trace and no stipule scars; buds small, often stalked, subglobose, superposed, bud-scales indistinct or almost valvate.

CALYCANTHUS FLORIDUS is recognized thus

SUMMER : aromatic shrubs; leaves opposite, short-petioled, entire, estipulate, ovate to elliptic, pinnately veined, densely pubescent beneath; flowers brownish-red or deep maroon red with numerous stamens and many narrow petals; fruit an indehiscent capsule, pear-shaped, rather large.

WINTER : shrub, sparingly branched; twigs moderate, villous, flattened at the nodes; leaf scars 2-ranked, opposite, the pairs often separated, horseshoe-shaped, much raised, with 3 bundle traces and no stipule scars; buds superposed, in a single bud-like aggregate, sessile, sometimes almost suppressed or hidden, brown-hairy, naked or appearing so; end-bud lacking.

CARAGANA ARBORESCENS is recognized thus

SUMMER : an unarmed shrub without particular odor; leaves alternate, pinnately compound, without terminal leaflets; leaflets obtuse, soft hairy; stipules often persisting as slender, soft prickles; flowers fascicled, yellow, pea-like; fruit small, beanlike.

WINTER : branchlets moderate, stiff, greenish, with 3 decurrent ridges below each leaf scar; leaf scars alternate, much raised, very small, $\frac{1}{2}$ -round, with the rachis often persisting as a spine, having one bundle trace and stipules persistent, often pungent; buds small to moderate, solitary, sessile, with 3-4 exposed scales.

COLUTEA ARBORESCENS is recognized thus

SUMMER : branches unarmed, bark fibrous; leaves alternate, pinnately compound, odorless; leaflets small, entire, more than three, with small stipules; flowers yellow in axillary, long-peduncled, few-flowered racemes, pea-like, with the wings about as long as the keel; fruit a glabrescent, inflated pod, indehiscent, with papery walls.

WINTER : twigs moderate, grayish, terete but with decurrent lines from the nodes, appressed pubescent; leaf scars alternate, broadly crescent-shaped, much raised, with 1-3 bundle traces and with the stipules persistent on the sides of the leaf cushion; buds small, globose-ovoid, with 2-4 outer scales, superposed.

CALLICARPA -- CALYCANTHUS -- CARAGANA -- COLUTEA

CEPHALANTHUS OCCIDENTALIS is recognized thus

SUMMER : leaves opposite or whorled, simple, entire, with triangular stipules; petioles moderate; flowers white, small, in dense globular heads, axillary; fruit a small achene in dense globular heads, tan-colored.

WINTER : twigs terete, red-brown with light lenticels, dying back at the tips, glabrous; pith small, angular; leaf scars opposite or whorled (often 3 at a node), roundish, raised, with one bundle trace, and with evident stipule scars or the stipules persisting; buds small, often superposed, conical, indistinctly scaly, in depressed pockets; end-bud lacking.

CEANOTHUS AMERICANUS is recognized thus

SUMMER : leaves alternate, simple,

inate, irregularly serrate, with three main veins from the base, pubescent or acuminate, moderately large, odorless, ovate to oblong-ovate, acute or acuminate, beneath, with small stipules; flowers small, white, in terminal and axillary racemes or panicles; fruit a capsule, 3-lobed at the apex, finally splitting into 3 dehiscent parts, the cuplike receptacles persisting.

WINTER : low shrub, unarmed; twigs terete, puberulent, rather slender, brown or greenish-brown; leaf scars alternate, 2-round, slightly raised, small, with one transverse, evidently compound bundle trace, and with small stipules often persistent; buds solitary, sessile, small ovoid, pubescent, with few outer scales of which only the lower ones are distinct.

CHIONANTHUS VIRGINICA is recognized thus

SUMMER ; leaves opposite, simple, entire,

dioecious; flowers white, in drooping panicles, from lateral buds, petals long and narrow; fruit a dark blue drupe, one-seeded.

WINTER : Bark firm; twigs gray, squarish, especially at the nodes, pubescent while young; pith continuous and persistent; leaf scars opposite, relatively broad, crescent-shaped, raised, not large, with one transverse bundle trace and no stipule scars; buds superposed, sessile, round-ovoid, relatively small, with about six stiff, pointed, keeled scales.

CLETHRA ALNIFOLIA is recognized thus

SUMMER : leaves alternate, toothed but not lobed, pinnately veined, serrate, glabrous, stipulate, short-petioled; flowers white, very fragrant, in terminal, panicle, racemes; fruit a small subglobose capsule, splitting in 3 valves, persistent.

WINTER : unarmed shrub; twigs brown, older twigs glaucous near tip, younger twigs scurfy tomentulose, then stellate-pubescent, obscurely triangular; leaf scars alternate, clustered near tip, triangular, low, with one bundle trace and no stipule scars; buds small, loosely scaled, solitary, sessile, ovoid.

CEANOTHUS --

CEPHALANTHUS --

CHIONANTHUS --

CLETHRA

COMPTONIA PEREGRINA* is recognized thus

SUMMER : leaves alternate, simple, petiolate, linear-oblong, deeply pinnatifid, with round-ovate, oblique, mucronulate lobes, pubescent, pungent when bruised; flowers in catkins; fruit an ovoid nutlet, glabrous, subtended by elongated, awl-like bracts.

WINTER : an aromatic shrub; twigs terete or angular, slender, resinous-dotted while young; pith small, green; leaf scars alternate, $\frac{1}{2}$ -elliptical or triangular, more or less raised, with 3 bundle traces and small stipule scars; buds small, solitary, subglobose, sessile, with 2-4 outer scales; end-bud lacking.

COMPTONIA (syn. Myrica)

The Genus CORNUS is recognized thus

SUMMER : erect, deciduous, unarmed shrubs; twigs reddish or greenish; leaves opposite except in one species, viz. alternifolia, petioled, entire, with anastomosing veins; flowers in terminal cymes or heads, small, often surrounded by involucre bracts; fruit a small drupe.

| species | arrangement | under side of leaves | pith | fruit | involucre | flowers | floral color | pubescence | leaves | lateral buds | habit | twig color |
|--------------|-------------|------------------------------------|-------------------|---|-------------------------------|------------------------------|--------------|-----------------------------------|---|----------------|-------------------|---------------|
| alternifolia | alternate | hairs irregularly diverging | | | | | | | cuneate | | | |
| amomum | opposite | light green, veins rusty-pubescent | brown | blue, spherical | | | | woolly, spreading | only the veins pubescent | | | red-violet |
| sanguinea | " | light gr., villous | white | black | | | | " | 2-5 veins petiole shortish | | | greenish |
| mas | " | " | " | red, elliptical, pedicel short | deciduous | dense umbels, with involucre | yellow | not woolly, glabrous | | very divergent | | |
| florida | " | whitened beneath | " | " | showy, with emarginate bracts | in flower-like heads | white | " | | | | |
| kousa | " | " | " | " | showy, with acuminate bracts | united in a globose flower | " | " | | | | |
| baileyi | " | " | " | white spherical | lacking | cymose | white | woolly, spreading or subappressed | ovate-lanceolate, loosely hairy beneath | stalked | | brownish-radi |
| stolonifera | " | " | " | " | " | " | " | closely appressed or glabrescent | ovate, acuminate, glabrous | sessile | stoloniferous | red |
| alba | " | " | " | elliptical, stone compressed | " | cymes flat | " | " | ovate or elliptic, acute, whitish beneath | long, stalked | erect, osier-like | bright red |
| racemosa | " | " | white or brownish | white with red pedicels, stone not compressed | " | cyme paniculate, convex | " | " | lanceolate | | erect, twigg | grayish |

CORNUS

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Summer Key

The Genus CORNUS is recognized in

WINTER : erect, deciduous, unarmed shrubs with red or green branches; leaf scars opposite, rarely alternate, meeting around the twig, small, narrow, in four ranks, with 3 bundle traces; pith continuous and persistent; winter buds elongated, with 2 valvate scales, axillary buds appressed.

| species | arrangement | fruit color | twig color | fruits | flower buds | leaf scars | habit | buds and twigs | branchlets | lateral buds | pith |
|--------------|-------------|------------------------|--------------------------------|---|----------------------------------|----------------------|---------------------------------|---------------------------------------|----------------------|---------------------------------|-----------|
| alternifolia | alternate | bluish, bloomy | green | united into a globose fleshy head | enlarged, flattened vertically | raised covering buds | stratified | | gla-brous | con-cealed | |
| kousa | opposite | red | | individually distinct but in dense clusters | " | " | " | | soon gla-brous | | |
| florida | " | " | " | " | enlarged, not flattened, obovate | not as above | erect, less stratified | | minute-ly ap-pressed | not con-cealed, very di-vergent | |
| mas | " | " | " | " | not en-larged | " | erect, twiggy | | silky-hairy | sub-erect | |
| racemosa | " | white, on red pedicels | grayish | in loose cymes | | " | ascending spreading | pubes-cent | woolly | sub-erect or nearly sessile | brown ish |
| anomum | " | blue | purplish-red | " | " | " | " | hairy all over | " | sessile or al-most so | white |
| sanguinea | " | black | green with upper side deep red | " | " | " | loose and osierlike | buds half-glairy, twigs scarcely cent | | stalked | " |
| baileyi | " | bluish-white | red | " | " | " | more erect, loose and osierlike | | | long-stalked | " |
| alba | " | " | " | " | " | " | stolonif-erous | " | " | not stalked | " |
| stolonifera | " | " | " | " | " | " | | | | | |

CORNUS -- Winter Key

The Genus *CORYLUS* is recognized thus

SUMMER : twigs moderate, zigzag, pubescent; leaves alternate, ovate, doubly serrate, more or less pubescent; flowers in catkins; fruit an ovoid nut in a thin, fringed or toothed involucre.

WINTER : an erect shrub with moderate, zigzag, pubescent twigs; buds alternate, solitary, sessile, set obliquely to the scar, ovoid and obtuse, with several to many exposed scales which are greenish in color with brown edges; end-bud lacking; leaf scars 2-ranked, half-round or triangular, a little raised, with 3 bundle traces and long stipule scars; flower-buds in catkins.

Summer Key

| species | branchlets | involucre | involucral bracts | leaves |
|-----------|---------------------|---------------|--|--|
| avellana | glandular-pubescent | of two bracts | not or only slightly longer than the nut | suborbicular to broad-ovate, often slightly lobulate |
| americana | " | " | about twice as long as the nut, closed | broad-ovate or oval |
| cornuta | slightly hairy | tubular | | ovate to obovate |

Winter Key

| species | buds | fruit |
|-----------|---|---|
| avellana | small, glabrescent | husk open, hardly longer than the nut |
| americana | small, gray-pubescent; outer scales persistent | husk closed or longer than the nut, frilled |
| cornuta | gray-pubescent, outer scales elongated, quickly falling | husk closed or longer than the nut, beaked or tubular |

The Genus COTONEASTER is recognized in

SUMMER : erect or sprawling shrubs; leaves simple, usually smallish, entire, short-petioled, alternate, with awl-like stipules; flowers white or pinkish, small and not conspicuous, terminal on short lateral branchlets; fruit a small drupe-like pome or pome-like drupe with persistent, incurving sepals, and 2-5 stones.

WINTER : twigs slender, rounded; leaf-scars alternate, minute, elliptical, raised, with one indistinct bundle trace and persistent stipules; buds solitary, sessile, ovoid or oblong, with the outer scales parted and showing the hairy bud inside.

| species | character | habit | leaves | under side of leaves | upper side of leaves | inflorescence | branches and twigs | flowers | size of leaves | buds | fruit |
|--------------|----------------------------|-----------|--------------------------------|--|----------------------|-----------------------|------------------------|-----------------------|------------------|---------------------------------------|-------------------|
| microphylla | evergreen or sub-evergreen | | obovate margin wavy | densely hairy | | | | petals spreading | | | red |
| horizontalis | " | | round-oval | sparingly strigose-pubescent | lustrous | | horizontally spreading | with up-right petals | | | red |
| rotundifolia | " | | " | hairy when young, soon glabrous | dull | | " | " | | | " |
| dameri | " | | elliptic | " | lustrous | | trailing and rooting | with spreading petals | | | " |
| adpressa | deciduous | prostrate | margin wavy | | | | | | | | " |
| zabelli | " | erect | apex mostly obtuse | yellow tomentose | | | | | one inch or less | | " |
| dielsiana | " | " | apex mostly obtuse | " | | | | | " | | " |
| hupehensis | " | " | apex obtuse or grayish acutish | thinly grayish tomentose | | many-flowered corymbs | | calyx villous | " | | " |
| divaricata | " | " | obtusish | glabrous or slightly pubescent on the midrib | | few flowered cymes | glabrescent | | " | | " |
| racemiflora | " | " | sub-orbicular, obtuse | white-tomentose | | many flowered corymbs | gray-tomentose | calyx tomentose | " | | " |
| intertrigima | " | " | obtusish | whitish or grayish tomentose | | | | | 1 inch or more | outer scales glabrescent, larger | " |
| acuminata | " | " | acute | glabrescent | | | | | " | smaller to glabrate | red, not glaucous |
| foveolata | " | " | mostly acuminate | pubescent chiefly on the veins | | | | | " | medium to large or persistently hairy | black |
| acutifolia | " | " | mostly acute | glabrescent | | | | | " | smaller, persistently hairy | " |

COTONEASTER

-- Summer Key

For winter identification of the Genus COTONEASTER see preceding page

| species | habit | fruit | branchlets | buds | twig color | pubescence | fruit | fruit position | sepals |
|---------------------|---|--|--|--|-----------------------------|------------------------------|---------------------|-------------------------------|--------|
| <i>acutifolia</i> | spreading bushy | black | moderate | smallish, persistently hairy | red-brown to very dark | twigs hairy | | | |
| <i>foveolata</i> | spreading | " | " | large, sub-glabrescent | gray-brown to straw color | " | | | |
| <i>racemiflora</i> | spreading and ascending | glaucous red | moderate, rigid | small, silky at first, finally glabrescent | | | | | |
| <i>hupehensis</i> | arching and drooping | red, not glaucous | very slender purplish to red-brown | small glabrate | yellowish | finally glabrate | | | |
| <i>dielsiana</i> | erect arching | red, small, hairy at apex | moderate dark brown | smallish to larger, and persistently hairy | " | densely gray-woolly | | on lateral spurs, not nodding | |
| <i>divaricata</i> | spreading | red, oblong | slender | small, persistently hairy | rusty-brown | glabrescent at least later | | | erect |
| <i>zabeli</i> | " | " | " | " | rusty-brownish to very dark | branchlets densely pubescent | | | |
| <i>interregia</i> | upright, bushy | hanging red, large, glaucous | moderate | larger, glabrescent or persistently hairy | " | " | glaucous red | nodding, axillary, large | |
| <i>acuminata</i> | " | red, large, ellipsoid, pubescent near apex | moderate dull dirty gray to reddish | larger, glabrate pointed | densely pale-brown woolly | " | pubescent near apex | | |
| <i>adpressa</i> | prostrate with creeping stems | red | strigose-pubescent, irregularly distichous | | | | | | |
| <i>horizontalis</i> | sub-evergreen spreading, regularly branched | red | strigose | | | | | | |

CYDONIA JAPONICA (Chaenomeles lagenaria) is recognized thus

SUMMER : leaves alternate, simple, toothed but not lobed, short-petioled, ovate to oblong, serrate, lustrous and glabrous, with often leaf-like stipules; branches often with terminal and lateral thorns; flowers red, varying from white to pink to deep red and orange; fruit a fairly large yellow pome.

WINTER : a much-branched shrub, with or without thorns; twigs moderate, terete, glabrous, orange or reddish, rigid, with or without terminal and axillary twig spines; leaf scars alternate, small, linear or crescent-shaped or narrowly triangular, raised, with 3 minute bundle traces and with rather long stipule scars; buds sessile, small, solitary becoming multiple, round-ovoid, with few outer scales; end-bud lacking.

CYTISUS SCOPARIUS is recognized thus

SUMMER : a small to moderate sized shrub with green stems; leaves alternate, simple or more usually 3-parted, sometimes minute or lacking, and with minute or absent stipules; leaflets obovate or oblanceolate with few appressed hairs while young, entire; flowers yellow, usually solitary, axillary, the style longer than the keel; fruit a flat, linear-oblong, dehiscent pod with villous margins, the seeds with a thickened and hardened appendage.

WINTER : unarmed and odorless; branchlets bright green, prominently ridged or angled, even almost winged; leaf scars alternate, very small, raised, with one indistinct bundle trace and minute stipule scars; buds small, solitary, sessile, round-ovoid, with about four often indistinct scales.

CYDONIA -- CYTISUS

The Genus DEUTZIA is recognized thus






SUMMER : erect shrubs with peeling bark; leaves opposite, short-petioled, serrate, without stipules; flowers in panicles or cymes, usually terminal on lateral branchlets, white or pinkish; fruit a 3-5-valved capsule, indehiscent.

WINTER : erect shrubs with brown, peeling bark; branches usually hollow; twigs terete, usually dying back at the tip; pith moderate, round, pale and spongy or brown and excavated; leaf scars opposite, 4-ranked, linear or triangular, with 3 bundle traces and no stipule scars; buds ovoid, nearly sessile, with several pairs of outer scales.

Summer Key

| species | habit | pith | petals | inflorescence | under side of leaves |
|------------|-------|------------------|------------------------------------|-----------------------------|----------------------|
| scabra | to 6' | brown, excavated | erect, blushed, oblong | broad, loose panicle | rough pubescent |
| rosea | to 3' | white | " | " | |
| gracilis | to 3' | " | erect, white, oblong | elongated panicle or raceme | glabrous |
| lemoinei | to 4' | " | spreading, white, broadly ovate | corymbs or cymes | glabrous |
| parviflora | to 6' | " | spreading, white, roundish-obovate | " | nearly glabrous |
| | | | | | stellate pubescent |

Winter Key

| species | pith | buds | bud scales | bud size | leaf scars |
|------------|------------------|----------------------------|------------|--------------------------|--|
| scabra | brown, excavated | | | | |
| parviflora | white | ovoid, canescent | acute | |  |
| lemoinei | " | glabrate, brownish, ovoid | attenuate | longer than lowest scale |  |
| rosea | " | glabrate, brownish, oblong | " | not so |  |
| gracilis | " | glabrate, brownish | " | triangular |  |
| | | | | linear |  |

DIRCA PALUSTRIS is recognized thus

SUMMER : an unarmed shrub with the branchlets enlarged upwards; leaves alternate, simple, entire, short-petioled, obovate, obtuse, cuneate, glaucescent beneath; leaf petioles enclosing and concealing the buds; flowers before the leaves, apetalous, short-stalked, pale yellow, in axillary clusters of 2-3 on old wood; fruit a pale green or reddish drupe, ellipsoid.

WINTER : a shrub with soft wood and very, very tough bark, unarmed, odorless; twigs flexible, enlarged upwards, glabrous, brownish with white lenticels, terete; leaf scars alternate, scalloped, almost encircling the bud, 2-ranked, elevated at the swollen nodes, with 5 bundle traces and no stipule scars; buds small, short-conical, solitary, sessile, with about 4 indistinct dark silky scales; end-bud lacking.

The ELAEAGNACEAE MAY be recognized both summer and winter by the silvery or brown scales which clothe the twigs and branches and leaves and buds.

| Genus | species | arrangement | foliage | thorns | twigs | winter buds | fruit | leaf margin | leaves | flowers & fruits |
|------------|--------------|-------------|-----------|----------|---------------------------------|--|--------------------------|----------------------|--------------------|------------------|
| Shepherdia | rotundifolia | opposite | evergreen | | | | | | | |
| | argentea | " | deciduous | present | silvery | | | | | |
| | canadensis | " | " | without | brown scurfy | | | | | |
| Hippophae | rhamnoides | alternate | " | terminal | gray-silvery, end in spines | brown scurfy | bright orange, poisonous | | very slender | |
| Elaeagnus | angustifolia | " | " | lateral | with silvery scales, none brown | no brown scales | dry, yellow, persistent | entire, not crisped | | |
| | argentea | " | " | without | with brown scales | with some brown scales, end-bud conical-ovoid | dry, silvery, soon gone | | silvery both sides | |
| | multiflora | " | " | " | " | dark, red-brown, subglobose | red, juicy, soon gone | more or less crisped | silvery beneath | pendent |
| | umbellata | " | " | " | silvery, with few brown scales | with few brown scales, small, appressed, end-bud elongated | red, juicy, persisting | much crisped | silvery beneath | erect |

sequence of bloom and fruiting

| | | | |
|-----------------------|--------------|-----------|--------------|
| argentea - flowers in | June | fruits in | August ff. |
| angustifolia | May, June | " | July, August |
| multiflora | " April, May | " | June, July |
| umbellata | " May, June | " | September |

DIRCA -- ELAEAGNACEAE

The Genus EUONYMUS is recognized thus

SUMMER : deciduous or evergreen shrubs, sometimes creeping or climbing by rootlets; twigs moderate, rounded or 4-lined from the nodes or 4-angled or 4-winged, characteristically green; pith angled or rounded, spongy or incompletely excavated; leaves opposite or nearly so, petioled, glabrous; flowers in axillary cymes, floral parts in 4's or 5's; fruit a 4-5 celled, lobed capsule (occasionally 2-3 celled); capsule pink or pinkish, orange within, and with black seeds.

| species | foliage | habit | leaves | branchlet color | twigs | fruit | buds | capsule color |
|--------------|-----------|----------------|----------------------------------|-----------------|-----------------------|-------------|-----------------------------------|--------------------------------|
| radicans | evergreen | trailing | broadly oval, dull above | | | | | |
| japonica | " | erect | elliptic to oblong, bright green | | | | | |
| obovata | deciduous | low, prostrate | obovate | | | | | |
| yedoensis | " | erect | obovate, large and coarse | orange | | | ovoid, scales with long points | |
| alata | " | " | not as above | greenish | winged | | | |
| americana | " | " | " | green | not winged, square | tuberculate | slender pointed divergent | deep rose-red |
| europa | " | " | " | " | terete, often 4-lined | smooth | less slender, less divergent | deep rose-pink |
| bungeana | " | " | " | " | " | " | obtuse buds elongated, appressed | very pale yellowish or pinkish |
| atropurpurea | " | " | " | purplish | " | " | oblong, with loose, oblong scales | violet-red |

EUONYMUS -- Summer Key

The Genus EUONYMUS is recognized thus

WINTER : shrubs with moderate twigs, rounded or 4-lined or 4-angled or 4-winged, characteristically green; pith angled or rounded, spongy or incompletely excavated; leaf scars opposite or nearly so, half-elliptical, rather small, slightly elevated, with one bundle trace and minute, indistinct stipule scars; buds with imbricate scales, solitary, sessile, with 3-5 pairs of serrulate scales.

| species | foliage | habit | twigs | fruit | bud scales | buds | twig color |
|---------------|-----------|----------------------|-----------------------|-------------------------------|------------------------|---------------------------|------------------------------|
| obovata | deciduous | low, prostrate | | | | | |
| alata | " | erect | corky winged | | | | |
| americana | " | " | not winged, square | tuberculate | | oblong, pointed, upcurved | |
| europa | " | " | terete, often 4-lined | smooth, 4-lobed lobes obtuse | appressed dry-margined | ovoid, obtuse | green |
| yedoensis | " | " | " | large, pale long-pointed | | ovoid | twigs green, branches orange |
| bungeanus | " | " | " | pink very pale pinkish-yellow | | slightly elongated | green |
| atropurpureus | " | " | " | violet-rose | loose, oblong | oblong | purplish |
| japonica | evergreen | " | | | | | |
| radicans | " | trailing or climbing | | | | | |

EUONYMUS -- Summer Key

EXOCHORDA GRANDIFLORA is recognized thus

SUMMER : a large shrub; leaves alternate, simple, oblong, cuneate, toothed near the tip, glabrous, glaucous beneath, with one main vein; flowers white with green centers, in loose, terminal racemes; fruit a 5-lobed capsule, persistent, separating into 5 bony sections, finally dehiscent; seeds winged

WINTER : unarmed and odorless; bark reddish, freely peeling, inner bark orange, branches gray-brown; twigs slender, glabrous, terete, roughened with lenticels and longitudinal fissures; leaf scars alternate, narrow, shallowly V-shaped or linear, raised, with 3 bundle traces and no stipule scars; buds moderate, solitary, sessile, ovoid with pointed and fringed scales.

EUONYMUS -- Winter Key -- EXOCHORDA

The Genus FORSYTHIA is recognized thus

SUMMER : loose shrubs with yellowish twigs and very bright green foliage; leaves opposite, petiolate, axillary, occasionally 3-parted, usually serrate; flowers very early, yellow, bell-shaped, axillary, with four oblong lobes; fruit a 2-celled, dehiscent capsule.

WINTER : loosely branched or scrambling shrubs with yellowish twigs and opposite arrangement; twigs somewhat angled, buds moderate and multiple, sessile, with about six pairs of scales; leaf-scars opposite, shield-shaped, rather small, raised, with one bundle trace and no stipule scars.

Summer and Winter Keys combined

| species | habit | twig color | pith | flowers | leaves |
|-------------|--------------|-------------------|---|-------------------|--|
| viridissima | erect, stiff | a little greenish | chambered or all excavated (through nodes and internodes) | with pistil long | long, narrow, plain outline |
| intermedia | arching | yellowish | solid at nodes, internodes chambered | with pistil short | elongated, partly lobed or divided on shoots |
| suspensa | pendulous | yellowish | nodes solid, internodes excavated | " | broad |

N.B. F. suspensa var. fortunei is rather erect in growth.

GAYLUSSACIA BACCATA is recognized thus

SUMMER : deciduous; leaves alternate, short-petioled, entire, with resin-glands above and below; flowers in dense but short racemes, axillary; fruit a berrylike drupe with 10 one-seeded nutlets, calyx persistent; seeds solitary in each fruit cell.

WINTER : twigs slender, terete, with a small pith, young growth resinous-dotted; leaf scars alternate, low, crescent-shaped or triangular, with one bundle trace and no stipule scars; buds solitary, sessile, ovoid, with 2-5 outer scales; end-bud lacking.

GENISTA TINCTORIA

is recognized thus

SUMMER : unarmed; leaves alternate, simple, glabrous beneath, ciliate, elliptic-oblong to oblong-lanceolate, entire, usually with small stipules; flowers yellow, in many-flowered, terminal racemes; fruit a linear-oblong pod, compressed but not flat, glabrous or glabrescent.

WINTER : upright or ascending, with the slender, bright green twigs not much branched; twigs ribbed or grooved, terete, glabrous; leaf scars alternate, much-raised, minute, with one indistinct bundle trace, and the stipules more or less persistent.

FORSYTHIA -- GAYLUSSACIA -- GENISTA

The Genus *HAMAMELIS* is recognized thus

SUMMER : erect shrubs with yellowish pubescent branchlets; leaves alternate, short-petioled, lopsided, sinuate-dentate, with large stipules which fall off early; flowers yellow, with strap-shaped petals, in short-peduncled, axillary, few-flowered clusters, occurring in autumn; fruit a tomentose, 2-valved capsule.

WINTER : twigs yellowish-pubescent or tomentose at first; leaf scars alternate, 2-ranked, half-round or 3-lobed, slightly raised, with 3 bundle traces and unequal stipule scars, one round and one elongated; buds naked, oblong, stalked, tomentulose.

Summer and Winter Keys combined

| species | leaves | buds | flowers | fruit | calyx |
|------------|------------------------------|-----------------|----------------|----------------------------------|------------------------|
| virginiana | obovate or elliptic | short (5-8 mm.) | in late autumn | surrounded to 1/2 by the calyx | brownish-yellow inside |
| vernalis | obovate, glaucescent beneath | short (5-8 mm.) | in late winter | surrounded to 1/2 by the calyx | dark red inside |
| japonica | broad-ovate, green beneath | long (10 mm.) | in late winter | surrounded at base only by calyx | red or purple inside |

HIBISCUS SYRIACUS is recognized thus

SUMMER : leaves alternate, simple, 3-lobed, ovate or rhombic-ovate, coarsely toothed above the middle, cuneate, short-petioled, palmately veined, glabrous, estipulate; flowers rather large and conspicuous, solitary, axillary; fruit a capsule, dehiscent into 5 valves; seeds flattened, with a ring of gray hairs about the margin.

WINTER : bark gray, firm; twigs terete, but fluted near the dilated tip and terminated by relatively large, roundish flower and fruit scars; pith white, green margined; leaf scars alternate, crowded near the ends of twigs, 3-round or transversely elliptical, raised, with ridges extending below, and with 4 compound and irregular, often indefinite bundle traces, stipule scars small, elliptical.

HAMAMELIS -- *HIBISCUS*

The Genus HYDRANGEA is recognized thus

SUMMER : erect or climbing shrubs with peeling bark; leaves opposite or whorled, petiolate, usually serrate, rarely lobed, without stipules; flowers in terminal corymbs or panicles, often with sterile marginal flowers; fruit a 2-5 celled capsule opening at the apex.

WINTER : soft-wooded shrubs or root-climbers; deciduous; twigs rounded, with a large, continuous, pale pith; leaf scars opposite or whorled, crescent-shaped, rather large, scarcely raised, free-stipule scars: buds moderate, solitary, sessile or very short-stalked, globose-conical to oblong, with 2-3 pairs outer scales.

Summer Key

| species | habit | twigs | leaves | flowers and fruits |
|-------------|----------|-----------------------|-----------|--------------------|
| petiolaris | climbing | | | |
| quercifolia | shrubby | tomentose, orange-red | lobed | |
| paniculata | shrubby | glabrate | not lobed | paniculate |
| arborescens | shrubby | glabrate | not lobed | flat-topped cymes |

Winter Key

| species | bark | buds |
|-------------|------------------------------------|----------------------------|
| petiolaris | | |
| quercifolia | tomentose, orange-brown
flaking | |
| paniculata | brown, firm | round, conical, horizontal |
| arborescens | yellow, firm | spreading, oblong |

HYDRANGEA

The Genus **HYPERICUM** is recognized thus

SUMMER : leaves opposite, short-petioled or sessile, entire, dotted with transparent glands, without stipules; flowers yellow, in terminal or axillary cymes, with numerous stamens; fruit a capsule dehiscing along the partitions.

WINTER : small shrubs with peeling bark; twigs slender, angled below the nodes; pith small, green or brown, spongy and finally excavated; leaf scars opposite, sometimes whorled, rhomboid or lens-shaped, scarcely raised, with one bundle trace and no stipule scars; buds solitary, sessile, minute, with several scales.

Summer Key

| species | stems | flowers | flower clusters | number of styles | leaves | cymes |
|-------------|-------------------|--------------------------|-----------------|------------------|-------------------------------|---------------------------|
| moserianum | terete or 2-edged | in 1-3 flowered clusters | | five | narrow ovate | |
| calycinum | 4-angled | solitary | | " | " | |
| lobocarpum | " | in cymes | many-flowered | " | linear-oblong to lanceolate | |
| kalmianum | " | " | few-flowered | " | linear-oblong | |
| densiflorum | " | " | " terminal | three | " | forming a terminal corymb |
| prolificum | 2-angled | " | axillary | " | narrow-oblong or oblanceolate | axillary |

Winter Key

| species | stems | angles of stem | buds | habit | inflorescence | capsule | furrows of capsule |
|-------------|------------------|---------------------|----------------------------------|----------------------------------|---------------------------|---------------------|--------------------|
| moserianum | terete | | | sub-shrub 2' high | | | |
| prolificum | winged or angled | two, not persistent | | stout, dense shrub | | | |
| calycinum | " | four, persistent | distinctly scaly | low, small shrub, stoloniferous | | | |
| kalmianum | " | " | scarcely with specialized scales | openly bushy, branches contorted | few-flowered cymes | ovoid | 5-angled |
| lobocarpum | " | " | " | upright, bushy | many-flowered cymes | oblong | " |
| densiflorum | " | " | " | erect, stiff and dense | in large terminal corymbs | completely 3-celled | 3-angled |

HYPERICUM

ILEX VERTICILLATA is recognized thus

- SUMMER : leaves alternate, of moderate size, simple, narrow elliptic or obovate, serrate, acute, cuneate, with impressed veins, estipulate; flowers solitary, axillary, small, whitish, short-stalked; fruit a bright red, globose drupe, holly-like, persistent.
- WINTER : an odorless and thornless shrub with smooth dark gray bark; twigs smooth gray, sometimes streaked lighter gray on the upper side; pith green; leaf scars more or less raised, with one bundle trace and minute stipule scars; buds smooth light gray, firm and hard, with 2-4 imbricate scales, sessile, superposed.

KOLKWTZIA ANABILIS is recognized thus

- SUMMER : leaves opposite, simple, broad-ovate, short-petioled, acuminate, base rounded, margin shallowly toothed or entire, ciliate, hairy beneath; flowers pink with a yellow throat, puberulous, paired forming terminal corymbs on short lateral twigs; fruit a capsule, ovoid, gray-tan, very bristly-hairy.
- WINTER: a shrub with freely peeling, gray-brown bark; twigs gray, pilose, with continuous white pith; very much like the Honeysuckles; leaf scars opposite, crescent-shaped or triangular, raised, connected by a line around the twig, with 3 bundle traces often confluent, and no stipule scars; buds gray-velvety, sessile, solitary, ovoid, with 3-4 pairs of scales.

KERRIA JAPONICA is recognized thus

- SUMMER : leaves alternate, simple, oblong-ovate, acuminate, doubly serrate; flowers yellow, solitary, perfect, with numerous stamens; fruit a dark brown achene.
- WINTER : an unarmed, odorless shrub; twigs bright green, slender, zigzag, 5-angled or ridged, glabrous, pith relatively large, white, continuous; leaf scars alternate, small, 2-ranked, crescent-shaped or triangular, slightly raised, with 3 bundle traces and no stipule scars; buds small, solitary, sessile, oblong, with about 5 outer scales, sub-appressed.

| | | | | |
|------|----|--------|----|-----------|
| ILEX | -- | KERRIA | -- | KOLKWTZIA |
|------|----|--------|----|-----------|

The Genus *LIGUSTRUM* is recognized thus

SUMMER : leaves opposite, simple, entire, short-petioled; flowers white, smallish, in terminal panicles; corolla lilac-like; fruit a 1-4 seeded berry-likedrupe, black or bluish-black.

Summer Key

| species | leaf scar | fruit color | branches | leaves | leaf tip | lenticels | habit | fruit |
|------------------|--------------|-----------------|------------|---------------------------------|----------|-----------|-----------------------------|---------------------|
| ovalifolium | broad as bud | | glabrous | | | | | |
| vulgare | narrow | black, glossy | " | | | | | |
| acuminatum | " | " | pubescent | pubescent above near the margin | acute | | | |
| amurense | " | dull blue-black | " | glabrous above | obtuse | prominent | | |
| ibota | " | " | " | " | " | low | tall, arching | nodding, pedicelled |
| ibota regelianum | " | " | " | " | " | " | low, spreading horizontally | " |
| quihoui | " | " | puberulent | " | " | " | | sessile |

LIGUSTRUM -- Summer Key

The Genus *LIGUSTRUM* is recognized thus

WINTER : deciduous but holding the leaves very late; twigs slender, round; pith moderate, white; leaf scars opposite or almost so, small, crescent-shaped or elliptical, raised, with one bundle trace and no stipule scars; buds small, sessile, ovoid, with 2-3 pairs of outer scales, occasionally superposed.

Winter Key

| species | leaf scar | branches | fruit color | lenticels | habit | fruit |
|------------------|--------------|------------|------------------|-----------|---------------------------|----------------------------|
| ovalifolium | broad as bud | glabrous | | | | |
| vulgare | narrow | " | black, glossy | | | |
| acuminatum | " | pubescent | " | | | terminal in line of branch |
| amurense | " | " | dull, blue-black | prominent | | |
| ibota | " | " | " | low | tall, arching | |
| ibota regelianum | " | " | " | " | low, spreading horizontal | nodding, pedicelled |
| quihoui | " | puberulent | " | " | " | " |
| | | | | | | sessile |

LINDERA BENZOIN -- see Benzoin aestivale

LIGUSTRUM --- Winter Key - LINDERA

The Genus LONICERA is recognized thus

SUMMER : leaves opposite, usually short-petioled or sessile, entire, without stipules; flowers in axillary, peduncled pairs, each with 2 bracts and 4 bractlets; corolla tubular; fruit a berry.

| species | habit | flowers and fruits | pith | floral color | upper lip of corolla | leaves | leaf tip | winter buds | bractlets | peduncles |
|-------------------|----------------------------|------------------------------|---------------------|-----------------------------------|----------------------|---|--------------------|--|------------------------------|-----------------------|
| sempervirens | climbing | terminal, interrupted spikes | | red trum-pet with yellow interior | | glabrous, glaucous | | | | |
| japonica halliana | " | axillary pairs | | white to yellow | | pubescent | | | | |
| fragrant-issima | shrubby spreading tangled | " | white | " | | broadly ovate acute or oval to ovate obtusish very smooth almost glabrous | | | | |
| standishi | shrubby ascending | " | " | " | | oblong-ovate acuminate bristly hairy | | | | |
| korolkowi | " | " | brown, exco-cavated | pink, not changing to yellow | divided to middle | 1" or less pubescent | acute or obtusish | | | |
| tatarica | " | " | " | " | divided to base | 1" or more glabrous | " | | | |
| bella | " | " | " | white or pink changing yellow | | nearly glabrous beneath | " | | | |
| notha | " | " | " | " | | glabrous | acuminate | | | |
| muendeniensi | " | " | " | " | | pubescent | acute or obtusish | | | |
| xylost-eum | " | " | " | white or pale yellow | | broad ovate to obovate densely soft pubescent | acute | elongated, pointed, with long-ciliate pubescent scales | | longer than petioles |
| chrysan-tha | shrubby tangled, spreading | " | " | " | | rhombic-ovate acuminate to ovate-lanceolate, pilose | acuminate | " | | " |
| morrowi | " | " | " | " | | gray-tomentose beneath | obtusish | small, gray | long as the ovary | " |
| ruprecht-lana | ascending shrubby | " | " | " | | | | " | small, glabrous or glandular | |
| maacki | erect, large shrub | " | " | " | | moderately large (2-3") pubescent on veins above and below | tapering both ends | large, brown, glabrous | | shorter than petioles |

LONICERA -- Summer Key

The Genus LONICERA is recognized thus

WINTER : twigs round, slender; leaf scars opposite, crescent-shaped, small, on the tips of the raised bases, with 3 bundle traces and often no stipule scars; buds often superposed, sessile, widely divergent, with numerous 4-ranked scales.

| species | pith | buds | twigs | bud size and position | bud scales | habit | bud tip | bud growth | lateral buds | twig bark |
|-------------------|------------------|-------------------|---------------------------------|-------------------------------------|------------------------------|----------------|---------|---|---|-------------------------------|
| fragrant-issima | white | | glabrous | | | | | | | |
| stand-ishii | " | | bristly hairy | | | | | | | |
| xylost-eum | brown exca-vated | elongated pointed | very hairy | terminal about equal lateral | gray with long ciliate hairs | | | | | |
| chrysanth | " | " | a little hairy | terminal mostly larger than lateral | " | | | | | |
| maacki | " | " | very scurfy | clustered in twig axils | glabrous, brown | | | | | |
| tatarica | " | not elongated | glabrous | slender-ovate pointed | | | | | | |
| bella | " | " | " | short, globose or oval, obtusish | | | | | | |
| ruprecht-lana | " | " | glabrescent or pubescent | | | erect | acute | | | peeling, scurfy, dark-colored |
| morrowi | " | " | pubescent | | | | | terminal less developed than lateral | very divergent, almost right angled to twig | |
| notha | | | " | | | | | lateral about equal to terminal or scarcely developed | less divergent about 60° | pubescent |
| muenden-iensis | " | " | " | | | | | | | |
| sempervirens | | | gray or straw-colored, glabrous | | | climbing | | | | densely woolly |
| japonica halliana | | | red-brown, hairy | | | sub-ever-green | | | | |

The Genus LYCIUM is recognized thus

SUMMER : leaves alternate, often fascicled, short-petioled, entire; flowers axillary, solitary or clustered, slender-petioled; fruit a red oblong berry.

Summer Key

| species | habit | twigs | leaves | fruit | foliage color | corolla tube |
|--------------|--|--------------------------|-----------------------------------|--------|---------------|---|
| chinense | scrambling, wide spreading, loosely branched | buff-gray | rhombic-ovate to ovate-lanceolate | oblong | bright green | shorter than the limb, rather wide |
| halimifolium | erect, spreading bushy, with moderate shoots | pale, not hairy in axils | oblong-lanceolate | oval | gray-green | longer than the limb, narrowed below the middle |

WINTER : scrambling shrubs with slender spinescent twigs; twigs 5-angled, glabrous, often whitish or short striate; leaf scars alternate, crescent-shaped, small, raised, with one bundle trace and no stipule scars; buds small and inconspicuously multiple or dwarf aggregates with few outer scales.

Winter Key

| species | habit | twigs | branchlets |
|--------------|---|---|-----------------|
| chinense | scrambling, wide-spreading, loosely branched | buff-gray, usually unarmed | light yellowish |
| halimifolium | erect, spreading, bushy, with moderate shoots | pale, not hairy in the axils; usually spiny | light gray |

LYCIUM

The Genus MYRICA is recognized thus

- SUMMER : leaves alternate, almost entire, resinous-dotted; flowers solitary in the axils of bracts forming catkins; fruit a small, globose, or ovoid drupe coated with resinous grains or wax.
- *Myrica asplenifolia (Comptonia) has leaves that are toothed or pinnatifid, very long and narrow. WINTER : twigs slender and dotted with resin; pith small, somewhat angled, continuous, green; leaf scars alternate, $\frac{1}{2}$ -elliptical or a little triangular, somewhat raised, with 3 bundle traces and small or no stipule scars; buds small, solitary, sessile, subglobose or ovoid, with one or two pairs of exposed scales; end-bud lacking.

Summer and Winter Keys combined

| species | leaves | fruit | habit | leaf tip | leaf | leaf form | leaf size | twigs |
|---------------|---------------------------------------|---------------------------------------|----------------------------------|----------|------------------|---|-----------------------------|-------|
| *asplenifolia | elongated, narrow & notched, fernlike | bur-like | | | | | | |
| cerifera | short, entire or with few notches | globular covered with wax | tall shrub for small tree to 40' | acute | often persistent | | | |
| carolinensis | " | " | low shrub | obtuse | " | oblanceolate to obovate | fairly large (2-4") | gray |
| gale | " | conelike catkins enclosed by 2 bracts | " | " | deciduous | oblanceolate to obovate, serrate near the tip | small (1-1 $\frac{1}{2}$ ") | --- |

*given elsewhere as Comptonia asplenifolia

N.B. twigs, fruit and habit are sufficient winter identification.

NEMOPANTHUS MUCRONATUS is recognized thus

- SUMMER : leaves alternate, simple, elliptic to oblong, mucronate, entire or slightly toothed, grayed beneath, slender petioled; flowers small, whitish, axillary, on slender peduncles, polygamodioecious; fruit a drupe, dull red, subglobose, glabrous, with 4-5 bony nutlets and without sepals at the base, long-stalked.
- WINTER : shrub, slender-branched and glabrous; twigs often short, more or less glaucous, with the bark finely fissured in age; leaf scars alternate, clustered at the ends, slightly raised, triangular, with one bundle trace and no stipule scars; buds smallish, ovoid, sessile, solitary, with the tip attenuate, and with 2-3 ciliate outer scales.

MYRICA

NEMOPANTHUS -- MYRICA

The Genus PHILADELPHUS is recognized thus

SUMMER : branches with solid white pith; bark orange, often but not always peeling; leaves opposite, dentate or entire, with 3-5 large veins from the base; flowers white, moderately large, fragrant, terminal on lateral branchlets, with 4 sepals and 4 petals, usually racemose but sometimes solitary or in 2-3 flowered cymes; fruit a 4-valved dehiscent capsule.

Summer Key

| species | older bark | leaves | flowers | petals | styles | anthers | pedicels & calyx | racemes | habit | twigs |
|--------------|-----------------------|-------------------------------|--|--------|---|---------------------|---|-------------------|------------------|----------|
| gordonianus | yellowish, firm | pubescent both sides, dentate | odorless | | | | glabrous | | | |
| lewisii | " | glabrous, almost entire | | | | | " | | | |
| virginialis | brown, peeling freely | | double | | | | densely pubescent | | | |
| var. rosace | " | | single, pink | | | | " | | | |
| microphyllus | " | thick, entire 1" or less | solitary or clusters 1-6, not racemes | | | | " | | | |
| falconieri | " | larger | simple or compound racemes, long, far exceed the stamens, deeply divided | | | | glabrous | | | |
| zeyheri | " | | pure white, 5-7, scarcely fragrant | broad | divided $\frac{1}{2}$, longer than stamens | white as the petals | " | | | |
| coronarius | " | tapering at base | cream-white 3-5, very fragrant | " | shorter than stamens | yellow | more or less villous, lobes of calyx glabrous except edge | rather long loose | erect tall loose | moderate |
| lemoinei | " | " | 3-7, very fragrant | " | " stigmas narrow, divided $\frac{1}{2}$ | " | glabrous or scarcely pubescent | short & dense | low dense twiggy | slender |
| grandiflorus | " | large and thin | in cymes, 1-3 flowered, not fragrant | " | " | | glabrous | | | coarse |

PHILADELPHUS -- Summer Key

The Genus PHILADELPHUS is recognized thus

WINTER : bark orange or brown, usually peeling; twigs more or less lined, angular; pith moderate, rounded, continuous, pale; leaf scars opposite, 2-round, with a thin membrane over the bud, becoming crescent-shaped when this bursts, connected by a line around the twig, with 3 bundle traces and no stipule scars; buds solitary, sessile, with one pair of barely overlapping hairy scales; end-bud lacking.

Winter Key

| species | older bark | fruits | lower pedicels | racemes | leaf scars | young branchlets | pedicels & calyx | buds |
|---------------------|-----------------------|---------|------------------------------------|----------------------------|------------|--------------------|--------------------------------|-----------------------|
| <i>gordonianus</i> | yellowish, firm | racemes | | | | slightly pubescent | glabrous | |
| <i>lewisii</i> | " | " | | | | glabrous | " | |
| <i>falconieri</i> | brown, freely peeling | " | long, often articulate or branched | 3-5 fruited loose & open | | " | | |
| <i>zeyheri</i> | " | " | short | " | | " | | |
| <i>*lemoinei</i> | " | " | " | 3-7 fruited, short & dense | | slender | glabrous or scarcely pubescent | 1 covered by membrane |
| <i>coronarius</i> | " | " | " | 5-7 fruited, longer | broad | moderate | more or less villous | |
| <i>virginalis</i> | " | " | medium | 3-7 fruited | | | densely pubescent | |
| <i>grandiflorus</i> | " | cymose | | 1-3 fruited | | | glabrous | |

N.B. Winter identification is difficult and not fully decisive.

*There are a number of Lemoine hybrids, for the most part similar in effect to *lemoinei*, except *P. rosace* which has pink or pinkish flowers in spring.

PHOTINIA VILLOSA is recognized thus

SUMMER : a tall unarmed shrub or small tree; leaves alternate, simple, pinnately veined, finely serrate, stipulate, short-stalked, obovate to oblong-obovate, acuminate, cuneate, glabrous above and villous beneath; flowers white, in corymbs or cymes; fruit a small pome with 4 seeds, open at the top.

WINTER : twigs brown, odorless, moderate, with large lenticels, not spiny but with many short spur-like twigs; leaf scars alternate, 2-ranked, linear-crescent-shaped and very slightly 3-lobed, raised, with 3 bundle traces and no stipule scars; buds solitary, sessile, ovoid, acute, with about 4 slightly keeled and mucronate scales, often slightly red in midwinter.

PTELEA TRIFOLIATA is recognized thus

SUMMER : leaves alternate, petiolate, palmately compound with 3 leaflets; leaflets subsessile, ovate to elliptic-oblong, entire or obscurely cuneate; flowers small, greenish, in corymbs; fruit suborbicular, a samara, the seed encircled by the wing, in large clusters.

WINTER : a sparse shrub, unarmed; twigs brownish, moderate, terete, warty and dotted, with a rather large whitish pith; leaf scars alternate, raised, rather large, horseshoe-shaped after the membrane is broken by the growing buds, with 3 bundle traces and no stipule scars; buds concealed under a membrane, small, closely superposed in pairs, low-conical, sessile, silvery-silky; end-bud lacking.

PHYSOCARPUS OPULIFOLIUS is recognized thus

SUMMER : leaves alternate, simple, broad-ovate, 3-5 lobed, toothed, estipular, glabrous; flowers white, in many-flowered corymbs, with an unpleasant odor; fruit a small capsule, with the follicles inflated and dehiscent along both sutures, glabrous.

WINTER : loosely branched shrub with shredding and peeling brown bark, under bark orange; twigs terete, 5-lined from the nodes, moderate, with largish, brownish pith; leaf scars alternate, half elliptical or slightly 3-lobed, raised on a cushion with 5 unequal bundle traces, the lowest one largest, and with small stipule scars on the leaf cushion; fruit often persistent.

QUERCUS PRINOIDES is recognized thus

SUMMER : Habit shrubby, spreading; branchlets soon glabrous; leaves short-petioled, pinnately veined, simple ovate-oblong to oblong, acute, cuneate, undulate-dentate with 3-7 pairs small teeth, glabrous above, grayish tomentulose beneath; flowers in catkins; fruit an acorn, sessile, ovoid, enclosed $\frac{2}{3}$ by the cup, the cup scales tuberculate.

WINTER : twigs moderate, fluted; pith star-shaped in section; buds solitary or collaterally multiple, sessile, globose, ovoid or conical, with numerous 5-ranked scales; leaf scars alternate, rather small, $\frac{2}{3}$ -round, slightly elevated, with 10-12 scattered bundle traces and small stipule scars.

PTELEA -- *PHYSOCARPUS* -- *QUERCUS*

The Genus RHAMNUS is recognized thus

SUMMER : twigs often spiny-tipped; leaves alternate or opposite, with one main vein, serrulate to entire, with stipules; flowers small, greenish, inconspicuous, in axillary clusters; fruit a globose or subglobose drupe.

WINTER : twigs slender, terete with a moderate, white, continuous pith; leaf scars in broken pairs or alternate, crescent-shaped or $\frac{1}{2}$ -elliptical, small, raised, with 3 bundle traces and minute stipule scars; buds moderate, solitary, sessile, naked or with several scales; twigs often ending in a thorn about the same length as the buds.

Summer Key

| species | spines | arrangement | buds | twigs | fruiting pedicels | winter buds | fruit |
|-------------|--|-----------------------|-------------|----------------------------|---|-----------------|------------|
| cathartica | present, scarcely longer than the buds | opposite or nearly so | scaly | slender | | | |
| davurica | " | " | " | spinescent stout, glabrous | | | |
| frangula | unarmed | alternate | naked short | pubescent | glabrous, separate or in sessile umbels | | globose |
| caroliniana | " | " | " | puberulous | several in a cluster, pubescent | hoary tomentose | " |
| purshiana | " | " | long | pubescent | " | | turbin-ate |

Winter Key

| species | arrangement | branchlets | buds | margin of leaves | fruit | leaves | under side of flowers |
|-------------|-----------------------|--------------------|-------|--------------------------------|------------------------------------|--|---|
| cathartica | opposite or nearly so | usually spinescent | scaly | serrate, teeth short or obtuse | short | large, dull, (11-41) thin, broad-ovate to elliptic | light green, with 2-3 pairs of ascending, veins |
| davurica | " | " | " | " | " | lustrous, firm, narrow elliptic to oblong | gray-green |
| frangula | alternate | unarmed | naked | usually entire | | lustrous, oval to obovate, acute | with 8-9 pairs of veins |
| caroliniana | " | " | " | nearly entire | peduncles shorter than the petiole | thickish, acute | 8-10 pairs of veins |
| purshiana | " | " | " | " | longer than the petiole | " | 8-15 pairs of veins |

RHAMNUS

RHODOTYPOS KERRIOIDES (syn. *R. scandens*) is recognized thus

SUMMER : leaves opposite, simple, ovate to ovate-oblong, acuminate, base rounded, sharply doubly serrate; flowers white, large, with 4 suborbicular petals and 4 serrate sepals; fruit a dry drupe, shiny brownish-black, obliquely ellipsoid, in clusters of four set above the persistent sepals.

WINTER : a loosely branched shrub; twigs moderate, glabrous, red-brown, somewhat lenticular; leaf scars opposite, crescent-shaped, moderate sized, ciliate at the top and connected by a ciliate line, with 3 bundle traces and no stipule scars; buds moderate, becoming collaterally multiple and at length very slightly stalked, ovoid, glabrous, with about 6 pairs of scales.

The Genus *RHUS* may be recognized thus

SUMMER : leaves alternate, pinnately compound, three to many-parted or simple, aromatic when crushed; flowers small, in terminal or axillary panicles; fruit a globose or compressed drupe, hairy or resinous, in compact clusters; twigs usually coarse.

Summer Key

| species | nature | fruits | habit | leaves | inflorescence | leaf margin | leaf rachis | leaf surface | twigs |
|-----------|---------------|------------------|----------------------|--------------|---------------|-----------------------------|-------------|----------------------------|--------------------|
| radicans | poisonous | glabrous whitish | trailing or climbing | three-parted | axillary | | | glabrous | |
| vernix | " | " | erect | many-parted | " | | | " | |
| aromatica | non-poisonous | red, hairy | " | three-parted | " | | | pubescent | |
| copallina | " | " | " | many-parted | terminal | entire or obscurely serrate | winged | glabrous, glossy | |
| javanica | " | " | " | " | " | coarsely serrate | " | brown-hairy beneath | |
| glabra | " | " | " | " | " | " | not winged | glabrous, glaucous beneath | glabrous glaucous |
| typhina | " | " | " | " | " | " | " | " | densely hairy |
| cotinus | " | black | " | simple | " | entire | | glabrous | glabrous, glaucous |

RHODOTYPOS -- RHUS Summer Key

The Genus RHUS is recognized thus

WINTER : twigs round or bluntly 3-sided, sometimes fluted, slender to very stout, pungently aromatic when cut or bruised, either very hairy or with prominent lenticels or smooth; leaf scars alternate, round or crescent-shaped or C-shaped and encircling the buds, more or less raised, with numerous bundle traces sometimes collected in groups and without stipule scars; buds moderate or rather small, solitary, sessile, round-ovoid, hairy and indistinctly scaly or with 3-4 evident scales; end-bud often lacking.

Winter Key

| species | habit | fruits | sap | leaf scars | twigs | lenticels | twig color |
|-----------|---|--------------------------------------|---------------------|--------------------------------|----------------|-----------------------------------|----------------|
| radicans | poisonous, trailing or climbing by aerial roots | glabrous, whitish | | | | | |
| vernix | poisonous, erect shrubby | " | | | | | |
| aromatica | non-poisonous, erect, shrubby | axillary red-hairy | offensively pungent | elevated, round, covering buds | | | |
| cotinus | " | terminal, black, in plumose clusters | summy aromatic | elevated | | | |
| copallina | " | terminal, red-hairy nodding | " | not elevated, U-shaped | not hairy | numerous, prominent, almost warty | orange-yellow |
| javanica | " | terminal, erect | " | not elevated, C-shaped | sparsely hairy | prominent | dark |
| typhina | " | " | " | " | densely hairy | concealed by hairs | brown to black |
| glabra | " | terminal curved | " | " | not hairy | visible, not prominent | red, glaucous |

The Genus RIBES may be recognized thus

SUMMER : unarmed or prickly shrubs; leaves 1-2" broad, alternate, petioled, simple, with 3-7 notched lobes, palmately veined, stipulate; flowers perfect or dioecious, 5-merous, in few to many flowered racemes, rarely clustered or solitary; fruit a small, sour, juicy, many-seeded berry crowned by the remains of the calyx.

WINTER : stems prickly or unarmed; twigs rounded, moderate in size, with decurrent ridges below the nodes; buds small, ovoid, solitary, sessile or becoming short-stalked, with about 6 loose scales; leaf scars alternate, linear or U-shaped or broadly crescent-shaped, slightly raised, with 3 bundle traces and no stipule scars.

Summer Key

| species | habit | flower clusters | flowers | floral color | under side of leaves | young branchlets | leaf form | sepals |
|------------|-------------------|-------------------|----------------------|--------------------|----------------------|---|---------------------|------------------------------------|
| alpinum | low, dense twiggy | erect racemes | short, inconspicuous | | | | | |
| sanguineum | loose, open | pendulous racemes | showy | red, pink or white | white tomentose | pubescent, often sparingly glandular & aromatic | | |
| odoratum | " | " | " | yellow | glabrous | pubescent | ovate to roundish | less than the length of calyx tube |
| aureum | " | " | " | " | " | glabrous or puberulous | roundish to obovate | more than the length of calyx tube |

N.B. The gooseberries have spines at the nodes and prickly fruits and more narrow leaf scars, while the currants are unarmed or seldom prickly

Winter Key

| species | habit | leaf scars | leaves in bud | branchlets | buds |
|------------|-------------------|------------|---------------|---|-------------|
| alpinum | low, dense twiggy | narrow | | nearly glabrous, buff | stalked |
| sanguineum | loose, open | broad | plaited | pubescent, often sparingly glandular and aromatic | " |
| odoratum | " | " | convolute | pubescent | " |
| aureum | " | broad | " | glabrous or puberulous | not stalked |

RIBES

The Genus ROSA is distinguished thus

SUMMER : twigs thorny, rarely unarmed; leaves alternate, pinnately compound, stipulate; flowers terminal, solitary or in corymbs, floral parts in 5's, pistils numerous, enclosed in an urn-shaped hip which becomes fleshy and berrylike enclosing several - to many-bony achenes.

WINTER : mostly shrubs, occasionally trailing or scrambling; branches moderate, terete, armed with prickles, often hooked prickles; leaf scars low, broadly crescent-shaped or almost linear, with 3 bundle traces and no stipule scars.

Summer and Winter Keys combined

| species | habit | number of leaflets | stems | leaflets | flowers | branchlets & prickles | prickles | branches | akenes | stipules | fruit |
|------------|---|----------------------|-------------|---|--------------------------------|--|--------------------------------------|--------------------------------------|-----------------------|--|-------------------------|
| wichuriana | prostrate, evergreen | nine | | lustrous, glabrous, obtuse, broad | small, white in large clusters | | | | | | small in large clusters |
| multiflora | high climbing, deciduous | seven | | pubescent, obovate to oblong | | | | | | | |
| setigera | deciduous, upright, with arching branches | 3, rarely 5 | | ovate, oblong, pubescent on veins beneath | large pink | | recurved | red | | | |
| blanda | erect, bushy | | | | | | | unarmed except suckers with prickles | | | |
| rugosa | " | | very thorny | rugose | | tomentose | needle-like nearly straight | | | | |
| acicularis | " | 3-7 oblong | not rugose | | | glabrous | " | prickly also on flowering branchlets | | flat | |
| nitida | " | 7-11 elliptic | | " | | glandular hispid | " | " | | " | |
| carolina | " | 5, rarely 7 elliptic | red | dull above | | | flattened at base or strongly hooked | | only in bottom of hip | | |
| canina | " | 5-7 oval | green | singly serrate | | thorns much dilated | " | | | | |
| rubiginosa | " | 5-7 broadly oval | " | doubly serrate, glandular, fragrant | | thorns not dilated | " | | | | |
| spinossima | " | usually 9 | | very small, base rounded | white to pink | flowering branchlets prickly & bristly | of 2 kinds | | | narrow with divergent & dilated auricles | black |
| hugonis | " | 5-13 | red-brown | small, oval, cup-shaped villous | yellow single | flowering branchlets not bristly | " | bristly at base never bristly | | " | red |
| zanthina | " | 7-13 | " | broad-oval | double yellow | " | " | | | " | " |

ROSA

The Genus RUBUS may be recognized thus

SUMMER : stems prickly and short-lived; leaves alternate, 3-parted or pinnately compound and with stipules; flowers showy, white to pink, in racemes or panicles or corymbs or solitary, usually terminal; floral parts in fives; fruit an aggregate of drupelets.

Summer Key :

| species | habit | leaves | fruit surface | flowers | stems | fruit | prickles |
|------------------------|-----------------------|--|------------------|--|---|-----------------------------------|-------------------------|
| odoratus | erect, unarmed | simple | | | | | |
| spectabilis | erect armed | compound | orange | solitary, large nodding, large | glabrous, with numerous fine prickles below | hollow, separating from the torus | |
| occidentalis | " | " | black, bloomy | moderate, in many-flowered corymbs | very glaucous, purplish | " | short |
| idaeus, var. strigosus | " | " | red, tomentulose | moderate, in racemes, petals erect | finely tomentose | " | few, broad |
| alleggheniensis | " | " | black bloomy | in densely glandular-hispid racemes | glandular pubescent | not hollow, retaining the torus | stout, straight |
| caesius | creeping or prostrate | compound, with narrow stipules attached to petiole | " | in corymbs, few-flowered, pubescent, glandular & prickly | Glabrous, terete, slightly puberulous | of a few large drupelets | weak, sparse, scattered |
| procumbens | " | compound | " | " | sub-terete, glabrous | " | stout, recurved |

N.B. This groups of Rubus does not develop flowers on first-year wood.

RUBUS -- Summer Key

The Genus RUBUS is identified thus

WINTER : twigs short-lived, soft-wooded, armed with prickles, moderate, often 5-angled, leaf scars alternate, torn and irregularly shriveled, on a much-raised and persistent petiole base, with the bundle traces completely indistinct and no stipule scars.

Winter Key

| species | habit | bark | stems | prickles | canes |
|----------------|--------------------------|------------------|--|---|----------------------------------|
| odoratus | erect
unarmed | shredding | villous
and glandular | | |
| idaeus * | " | not
shredding | finely tomentose,
straw-colored | more straight, numerous,
bristly-like | at most very
stoloniferous |
| spectabilis | erect,
armed | " | glabrous, with numerous
fine prickles below | fine | |
| occidentalis | " | " | very glaucous,
purplish | short, stout, and
persistent, strongly hooked | recurving,
rooting at the tip |
| alleghehiensis | " | " | stellate-pubescent
near the apex, grooved, | more straight, especially
on stems, persistent | at most very
stoloniferous |
| caesius | creeping or
prostrate | " | glaucous, terete,
slightly puberulous | weak, sparse,
scattered | |
| procumbens | " | " | sub-terete,
glabrous | stout, slender
straightish | |

*consider strigosus as a variety of idaeus

RUBUS -- Winter Key

The Genus *SALIX* is recognized thus

SUMMER : TWIGS very flexible; leaves alternate, petiolate or sessile, mostly lanceolate, toothed or entire, often stipulate; flowers in catkins with or before the leaves; fruit a 2-valved capsule.
WINTER : Bark smooth, wood soft, twigs very flexible; leaf scars alternate, low, U-shaped, with 3 bundle traces and short, if any, stipule scars; buds oblong, appressed, sessile, solitary, with one cap-like scale which splits on the inside next the twig.

Summer and Winter Keys combined

| species | mature leaves | underside of leaves | buds | habit | branchlets | leaf form | leaf margin | leaf tip | fruits |
|-----------|--------------------------------------|--------------------------------|-------------------------------|-----------------------------|----------------------------|--|--------------------------------|-----------------------------|---|
| caprea | glabrous | glaucous or glaucous | stout & reddish | tree or shrub | young branchlets pubescent | elliptic | serrate | acute or abruptly acuminate | |
| discolor | " | " | more slender and nearly black | shrub | young branchlets tomentose | generally oblong | " | more or less acuminate | |
| irrorata | " | " | white-villous | | blisomy | lanceolate to linear-lanceolate | obscurely serrulate sub-entire | | |
| lucida | " | green | moderately large | | lustrous, yellow-brown | ovate-lanceolate to oblong lanceolate with glandular petiole | glandular-serrate | very long-acuminate | dull straw-color bottle-necked |
| pentandra | " | " | " | | polished green or chestnut | broadly ovate to oblong-lanceolate with a glandular petiole | " | shortly acuminate | lustrous straw-color tapering gradually |
| incana | villous with loosely appressed hairs | densely pubescent or tomentose | moderate orange-red | a large shrub to 20' or 40' | orange-red villous | linear | serrulate near apex, revolute | | |
| humilis | " | glaucous and soft pubescent | small to 3 mm. | a shrub 3' to 9' | pubescent or tomentose | oblanceolate to oblong-lanceolate | entire or subentire | | |
| tristis | " | glabrescent | small to 2 mm. | a shrub to 18" | glabrescent | narrowly oblanceolate to linear lanceolate | | | |

Also see *Salix* among the trees

SALIX

The Genus *SAMBUCUS* may be recognized thus

SUMMER : open shrubs with coarse, angled twigs; pith large and soft, continuous; leaves opposite, pinnately compound; leaflets serrate; flowers small, in terminal compound corymbs or panicles; floral parts in 5's; corolla rotate; fruit a berry-like drupe with 3-5 nutlets.

WINTER : branches stout; pith large and soft, continuous; leaf scars opposite or whorled, broadly crescent-shaped or triangular or rhomboid, large, low, more or less connected around the twig, with 3-5-7 bundle traces and no stipule scars; buds solitary or multiple, the larger ones stalked, ovoid, or depressed with 3-5 pairs of scales; end-bud usually lacking.

Summer Key

| species | fruit | flowers | twigs | foliage color | under side of leaves | leaflets | odor |
|-------------------|-------|--------------------------|----------------|---------------|-----------------------|-----------|---------------------------|
| <i>racemosa</i> | red | convex cymes or panicles | often 4-angled | | | | |
| <i>canadensis</i> | black | flat cymes | terete | bright green | glabrous | usually 7 | slight |
| <i>nigra</i> | black | " | " | dark green | pubescent while young | usually 5 | disagreeable when bruised |

Winter Key

| species | pith | branches | lenticels | odor |
|-------------------|-------|-------------|------------------------|--------------------------------------|
| <i>racemosa</i> | brown | light brown | | |
| <i>canadensis</i> | white | yellow gray | moderate | slight |
| <i>nigra</i> | white | gray | numerous and prominent | strong and disagreeable when crushed |

SAMBUCUS

The Genus *SORBARIA* is recognized thus

SUMMER : leaves alternate, pinnately compound, thin, sharply serrate, stipulate; leaflets lance-oblong; flowers white, in large terminal panicles, floral parts in fives; fruits tan-colored, dehiscent capsules.

WINTER : low shrubs, not twiggy nor much branched; twigs rather stout for the size of the plant, glabrous and terete; pith rather large, brown, continuous; leaf scars alternate, relatively large, rounded or irregular in form, scarcely raised, with 3 bundle traces and no stipule scars.

Summer and Winter Keys combined

| species | twigs and buds | habit | flowers | fruits | leaf margin |
|-------------------|----------------|--------------------|-------------------------------|----------------------|----------------|
| <i>lindleyana</i> | red-brown | shrub to 8' | in mid-summer, clusters 8-12" | on recurved pedicels | doubly serrate |
| <i>sorbifolia</i> | gray-brown | shrub to 5' | late spring, clusters 5-12" | upright | " |
| <i>aitchisoni</i> | red to purple | shrub to 7' or 10' | late summer, clusters 8-12" | " | singly serrate |

SORBARIA

The Genus SPIREA may be recognized in

SUMMER :leaves alternate, simple, dentate or serrate or sometimes lobed, rarely entire, with short petioles and no stipules, pinnately veined; flowers small in umbel-like racemes, corymbs or panicles, floral parts in fives; fruits tan-colored capsules, dehiscent at the top.

Summer Key

| species | flowers | leaf margin | leaves | floral color | inflorescence |
|---------------|--|-------------------------------|-------------------------------------|---------------|-------------------------------------|
| van houttei | umbels, with the leaves, on new shoots | incisely serrate, often lobed | glabrous, apex acute | white | |
| hypericifolia | umbels before leaves, on old wood | entire | | " | |
| thunbergi | " | serrate or dentate | linear-lanceolate, glabrous | " | 3-5 flowered, sessile |
| arguta | " | " | oblong, finely pubescent when young | " | many-flowered, lower umbels stalked |
| prunifolia | " | denticulate | oblong, pubescent beneath | " | umbels all sessile, 3-6 flowered |
| *bumalda | corymbs at tips of branches | | | pink or white | flat-topped corymbs |
| tomentosa | panicles | unequally serrate | tawny beneath, ovate | pink | brownish tomentose |
| billiardi | " | sharply doubly serrate | pubescent, oblong | | tomentulose |
| salicifolia | " | sharply serrate | glabrous, lanceolate | " | " |
| alba | " | often doubly serrate | glabrous, elliptic | white | tomentose |
| latifolia | " | sharply serrate | glabrous, oblanceolate | " | glabrous |

*bumalda var. antony waterer is a better color than the type.

The Genus SPIREA is recognized thus

WINTER : shrubs, low and little branched or with slender, arching, wand-like branches; twigs terete or angled from the nodes, more or less zigzag; with small, rounded, continuous buds small, usually solitary or occasionally collaterally multiple, sessile, globose or spindle-shaped, with about 6 outer scales; leaf scars alternate, 3-round or crescent shaped, minute, often much raised, with one bundle trace and no stipule scars.

Winter Key

| species | buds | twigs | branchlets and buds | lateral twigs | bud arrangement | bark color | pubescence | vestiges of inflorescence |
|---------------|------------------------------------|---------------------|---------------------------|-----------------------------------|-----------------------------------|--------------------------------|---------------|--|
| van houttei | conical, with several outer scales | slender terete | glabrous | | | | | |
| hypericifolia | ovoid | sub-terete | pubescent | | | | | |
| prunifolia | " | more or less angled | " | fine, zigzag | often collaterally multiple | gray | | |
| arguta | " | " | puberulous or glabrescent | filiform or numerous | " | red-brown | gray or dingy | |
| thunbergi | " | " | " | " | solitary | yellow-brown | " | |
| bumalda | " | " | not glaucous | neither very slender nor numerous | solitary or collaterally multiple | | " | persistent corymbs at tips of branches |
| tomentosa | " | " | brown tomentose | " | " | | " | persistent panicles, brown-tomentose |
| billiardi | " | " | pubescent | " | " | gray-brown | " | paniculate dingy-tomentulose |
| salicifolia | " | " | puberulous | " | " | yellow-brown | " | panicles pubescent |
| alba | " | " | " | " | " | red-brown | scanty | panicles dingy tomentulose |
| latifolia | " | " | glabrous | " | " | bright, none or dark red-brown | none | paniculate, glabrous |

STAPHYLEA TRIFOLIA is recognized thus

SUMMER : leaves opposite, pinnately compound with 3 leaflets, stipulate and stipellate, lateral leaflets sessile, unequally serrulate, elliptic to ovate; the stipules deciduous; flowers regular, in terminal panicles, sepals and petals of equal length, greenish-white or slightly pinkish, inconspicuous; fruit an inflated, membranous capsule, 3-lobed, dehiscent, with several shiny, bony seeds.

WINTER : twigs with smooth, striped bark, moderate, terete, glabrous, with a rather large pith; leaf scars opposite, $\frac{1}{2}$ -round, slightly raised, with 3-7 bundle traces which are compound, and the stipule scars $\frac{1}{2}$ -round or elongated; buds ovoid, with 2-4 scales, solitary, sessile, glabrous; the end-bud usually lacking.

STEPHANANDRA FLEXUOSA (syn. incisa) is recognized thus

SUMMER : leaves alternate, 2-ranked, serrate and deeply lobed, ovate, long acuminate, broadly cordate, pubescent on the veins beneath, stipulate; flowers small, greenish-white, in loose terminal panicles, the bracts awl-like and shorter than the slender peduncles.

WINTER : branches slender, zigzag, nearly round or slightly 5-lined from the nodes, red-brown; leaf scars alternate, 2-ranked, small, $\frac{1}{2}$ -round or triangular, a little raised, with 3 bundle traces and rather large stipule scars; buds superposed, small, ovoid or oblong, with about 4 outer scales.

The Genus SYMPHORICARPUS is recognized thus

SUMMER : leaves opposite, short-petioled, entire or occasionally lobed on vigorous shoots, and without stipules; flowers small, axillary, usually forming clusters or terminal spikes; fruit a 2-seeded berry.

WINTER : deciduous shrubs with slender, arching branches, more or less pubescent; pith small, brownish, usually excavated; buds small, solitary or collaterally multiple or developing lateral branches the first season, ovoid-oblong, more or less compressed, sessile, with about 3 pairs of keeled scales; leaf scars opposite, $\frac{1}{2}$ -round, small, ragged or torn, raised, partly connected by transverse ridges, with one indistinct bundle trace and no stipule scars.

Summer and Winter Keys combined

| species | inflorescence | fruit | pith | corolla | young branchlets |
|----------|-------------------|-------|------------|------------------|------------------|
| racemosa | terminal racemes | white | excavated | pubescent inside | glabrous |
| vulgaris | axillary clusters | red | continuous | glabrous inside | pubescent |

The Genus SYRINGA is distinguished thus

SUMMER : shrubs or small trees with opposite, petiolate leaves having the margins entire; flowers and fruits in terminal or lateral panicles on wood of the previous season; calyx and corolla with four parts, corolla saucer-shaped with a tube and four valvate lobes; stamens two; fruit an oblong capsule splitting in two parts.

WINTER : deciduous shrubs or small trees; twigs moderate or slender; pith moderate, homogeneous, round, pale in tone; buds usually solitary, sessile, ovoid, with about four pairs of exposed scales, end-bud frequently absent and the branches forked; leaf scars opposite, crescent or shield-shaped, raised, rather small, with one compound bundle-trace and no stipule scars.

Winter identification of species is uncertain and incomplete at present.

(see tabular key to species on following page)

SYRINGA

| species | flowers | habit | inflor-
escence | corolla
lobes | panicles | underside
of leaves | corolla
tube | branchlets | anthers | leaves | flower
clusters |
|------------------|--|-------------------------------------|---|---|--------------------|--|--|---|----------------------------------|--------------------------------------|--------------------|
| pekinen-
sis | cream-white,
corolla-
tube short | large
shrub | | | | | little long-
er than
calyx | | | cune-
ate | |
| amuren-
sis | " | " | | | | | base
rounded | | | base
rounded | |
| japon-
ica | " | small tree
bark cher-
ry-like | | | | | " | | | sub-
cordate | |
| emodi | not yellow-
ish, corolla
tube longer
than calyx | shrub, with
simple
leaves | terminal,
leafy at
the base | reflexed,
stamens
protruding | | papillose | much longer
than calyx | | | | |
| reflexa | " | " | " | erect or
spreading
stamens
not pro-
truding | pendulous
not | papillose | " | | | | |
| yunnan-
ensis | " | " | " | " | not pen-
dulous | | " | | | | |
| josi-
kaca | " | " | " | " | " | not papil-
lose, glau-
cescent
color dark | longer than
calyx, wide-
ned above
the middle | pubescent | deep-sep-
als long,
large | capsule
acute | |
| wolfi | " | " | " | " | " | " | " | glabrous | " | | |
| swegin-
zowi | " | " | " | " | | | | | near mouth
of tube | base
rounded,
ovate | |
| villosa | " | " | " | " | pale
pinkish | | | | " | oblong,
cuneate | capsul
obtuse |
| persica | " | " | lateral,
terminal
bud usual-
ly absent | | | | | | | lanceo-
late, base
cuneate | |
| chinen-
sis | " | " | " | " | | | | | | narrow-
ovate
cuneate | |
| vulgar-
is | " | " | " | " | | | | | near the
mouth of
the tube | ovate
or
cordate | |
| oblata | " | " | " | " | colortone
pale | | | leaf scars
medium, in-
conspicu-
ous | deep-set | broad-
ovate,
tinged
maroon | |
| meyeri | " | " | " | " | colortone
dark | | long, very
slender | glabrous,
leaf scars
large &
conspicuous | | pubescent,
slightly
square | ovate
cordate |
| palibin-
iana | " | " | " | " | glabrate | shorter
under | | purplish,
glabrous | | " | long &
slender |
| micro-
phylla | " | " | " | " | pubescent | | " | slightly
pilose | | " | short &
dense |
| pinnati- | " | shrub,
leaves
compound | " | " | glabrous | | | | | | |

The Genus TAMARIX is distinguished thus

SUMMER : a very fine-textured shrub or tree; branches very slender, terete, the ultimate small branchlets falling with the leaves; leaves small, almost scale-like, often sheathing; flowers small, short-pedicelled or sessile in dense racemes collected in terminal panicles; fruit a dehiscent capsule with many minute seeds and with a tuft of hairs at the apex.

WINTER : shrubs or small trees with slender branches; pith small, not central; twig lacking leaf scars, bundle traces or stipule scars; the dilated base of the alternate leaves persisting; buds small, sessile, rounded, appressed, solitary or concentrically multiple, with about 3 scales.

Summer Key

| species | flowers | floral parts | foliage | petals | branches | disk | blooming season |
|------------|--|--------------|------------------------------|------------|---------------------|---------------------|-----------------|
| parviflora | lateral racemes on last year's wood | in 4's | blue-green | | arching | | earliest of all |
| gallica | terminal panicles on wood of current year, dense and large | in 5's | bright green or yellow-green | deciduous | spreading, glabrous | 5-angled or 5-lobed | |
| pentandra | terminal panicles, slender | | glaucous or pale green | persistent | glabrous, upright | 10-lobed | |

Winter Key

| species | habit | twigs and buds | buds |
|------------|-----------|----------------|---|
| pentandra | upright | purple | glabrous, small |
| parviflora | arching | dark purple | glabrous, small |
| gallica | spreading | red-brown | small, globose and very hairy, multiple |

The Genus *VACCINIUM* is recognized thus

SUMMER : leaves alternate, short-petioled, glabrous or puberulent beneath, entire or serrate, narrow-elliptic to oblong lanceolate or obovate, acute both ends; flowers axillary or terminal, solitary or in racemes, the corolla cylindric and 4-5 lobed; fruit a fleshy, many-seeded berry with persistent calyx lobes, bloomy blue-black.

WINTER : unarmed, odorless shrubs; branchlets slender or very slightly angular, somewhat hairy, brown or greenish tinged red, nearly glabrous and smooth; leaf scars alternate, very small, $\frac{1}{2}$ -round or crescent-shaped, slightly raised, with one bundle trace and no stipule scars; buds small, ovoid, solitary, sessile, with two or more pointed scales; end-bud usually lacking.

Summer and Winter Keys combined

| species | habit | branchlets | buds | leaves | flowers | habitat |
|----------------|---------------|--------------------------------|-----------------------|---|--------------------------------------|---------------------|
| corymbosum | tall shrub | angled and warty | ovoid, scales pointed | glabrous beneath, entire or nearly so | cylindric corolla, longer than broad | moist woods or bogs |
| pennsylvanicum | low and dwarf | grooved above buds, puberulous | " | glabrous both sides, serrulate with bristle-pointed teeth | short-cylindric, broader than long | dry, sandy slopes |

VACCINIUM

The Genus *VIBURNUM* is recognized thus

SUMMER : shrubs or small trees; Leaves opposite, rarely whorled, entire, dentate, or lobed, usually without stipules; flowers small, white or pinkish, in umbel-like or paniculate compound cymes, floral parts in 5's; fruit a one-seeded drupe with the stone usually compressed.

Summer Key

| species | foliage | branchlets | fruit | leaves | leaf form | flower clusters | petiole | leaf scars | winter buds | leaf color |
|----------------|-----------------------|------------------------------|-------------------|---|----------------------|---|---|----------------------------------|-----------------|---------------------------|
| americanum | lobed | glabrous | red | glabrous below | | | with broad shallow grooves & small glands | | | |
| opulus | " | " | " | pubescent below | | | with narrow grooves and large glands | | | |
| acerifolium | " | pubescent | bluish-black | densely pubescent below & black dotted | | | | | | |
| rhytidophyllum | not lobed, persistent | stellate-pubescent | -- | sub-evergreen | | | | | | |
| cassinoides | not lobed deciduous | glabrous | -- | remotely denticulate | | peduncles shorter than the cyme | | | soon leaden | |
| lentago | " | " | | sharply finely serrate | | umbel-like, flat, sessile | with broad, wavy margin | | leaden | |
| prunifolium | " | glabrous, rigid | | " | | " | not margined | | leaden | tinged red with red stems |
| rufidulum | " | rigid | | | | | margin narrow, not wavy | | rusty pubescent | |
| molle | " | puberulous with peeling bark | blue-black | dull, pubescent beneath | broadly ovate | | | | with scales | deep bright green |
| dentatum | " | glabrous | " | lustrous | " | | | | " | " |
| dilatatum | " | pilose | red | both sides pubescent, with more than 5 pairs of veins | " | | | | " | " |
| sieboldi | " | pubescent | red changes black | glossy, veins compressed | oblong elliptical to | all flowers fertile, marginal flow-ers sterile & enlarged | | broad, meeting relatively narrow | " | lively bright green |
| tomentosum | " | stellate tomentose | " | | " | | without stipules | | " | dark green |
| lantana | " | scurfy pubescent | " | closely denticulate | " | umbel-like, flat, of small white, fertile flowers | | naked | | dark, dull green |
| carlesi | " | stellate tomentose | " | coarsely dentate | " | umbel-like, pinkish, large very fragrant | | | | gray-green |
| burkwoodi | " | puberulous | " | glabrous & glossy | " | white, flushed | | | | dark green |

VIBURNUM -- Summer Key

The Genus VIBURNUM may be recognized thus

WINTER : twigs moderate, more or less hexagonal, pith continuous, white or brownish; leaf scars opposite, crescent-shaped, raised or meeting or connected, with 3 bundle traces and no stipule scars; buds solitary or rarely superposed, usually stalked, scaly or naked, ovoid or oblong.

Winter Key

| species | foliage | branches | buds | bud
scales | leaf
scar | bud
form | twig | bark | bud
color | fruit |
|----------------|------------|---------------|-------------------|------------------------------------|-------------------|------------------------|---------------------------------------|---------|-----------------|------------------------------|
| rhytidophyllum | persistent | | | | | | | | | |
| lantana | deciduous | | naked | | narrow | | stout, densely pubescent, scurfy | | | |
| carlesii | " | | " | | " | | more slender, stellate-tomentose | | | |
| molle | " | | scaly | imbricate | " | | glabrous, gray | peeling | | |
| dentatum | " | | " | " | " | | " | firm | | |
| acerifolium | " | | " | " | " | squared | pubescent | " | | |
| prunifolium | " | rigid | " | valvate | " | oblong or flask-shaped | reddish, pubescent, rigidly spreading | | a little leaden | |
| rufidulum | " | " | " | " | " | | rusty-pubescent, stout, rigid | | rusty, fired | |
| dilatatum | " | more flexible | scaly, hispid | valvate, outer scales parted short | relatively narrow | sub-ovoid | stout, very hairy, hispid | | | |
| sieboldii | " | " | scaly, not hispid | closely valvate like a sack | broad, meeting | | stout, pubescent | | | |
| tomentosum | " | " | " | " | relatively narrow | sub-ovoid | brown, stellate-tomentose | | brown | |
| cassinoides | " | " | " | " | " | flask-shaped | dull brown, scurfy | | brown | |
| lentago | " | " | " | " | " | " | dull leaden, scurfy | | leaden | |
| opulus | " | " | " | " | " | oblong, short-pointed | glabrous | | red to green | shrivels, loses color |
| americanum | " | " | " | " | " | ovoid | " | | " | remains plump and bright red |

The new variety burkwoodii is recognized by Mr. Rehder as a variety of carlesii, from which it is easily distinguished by the less hairiness; twigs being puberulous or glabrous rather than tomentose.

The Genus *WEIGELA* is recognized thus

SUMMER : leaves opposite, short-petioled to sessile, serrate, without stipules; flowers in axillary cymes, often panicled at the end of branchlets; corolla funnelform, floral parts in 5's; fruit a 2-valved capsule.

WINTER : branches moderate, with solid pith, bark scurfy gray, with rather large circular lenticels; twigs straw-colored or brownish, with 2-4 decurrent hairy ridges from the nodes; leaf scars opposite or in whorls of three, broadly shallow crescent-shaped, connected by lines, with 3 bundle traces and no stipule scars; buds with several pairs of pointed scales, often superposed, sessile, oblong, appressed; fruits persistent, linear, 2-valved, dehiscent capsules, with the central partition exposed and extending.

Summer Key

| species | branchlets | flowers | leaves | under side of leaves |
|-------------------------------------|-------------------------------|--|--|---|
| <i>Diervilla</i>
<i>lonicera</i> | glabrous or nearly so, terete | yellow | hairy on edges | |
| <i>floribunda</i> | pubescent | | | |
| <i>amabilis</i> | with 2 rows of hairs | dark crimson, sepals linear, distinct, seeds winged
rosy-pink, sepals lanceolate, connate, seeds not winged | pubescent above
glabrous above except on midrib | villous pubescent chiefly on veins
pubescent or tomentose on veins |

Winter Key

| species | branchlets | fruiting capsule |
|-------------------------------------|-------------------------|--------------------------|
| <i>Diervilla</i>
<i>lonicera</i> | glabrous | glabrous, slender-beaked |
| <i>amabilis</i> | with 2 rows of hairs | glabrous |
| <i>floribunda</i> | pubescent or with hairs | pubescent |

XANTHOCERAS SORBIFOLIUM is recognized thus

SUMMER : shrub or tree; leaves alternate, pinnately compound; the leaflets opposite, sessile, serrate; flowers showy white with a red or yellow blotch at the base of the petals, polygamous, in racemes, slender-stalked, the upper flowers fertile, lower ones usually sterile; fruit a green, 3-valved capsule

WINTER : a tree-like shrub; twigs moderate, terete, coarsely lenticular, glabrous; leaf scars alternate, $\frac{1}{2}$ -elliptical, moderate, raised, with 3 large bundle traces and no stipule scars; buds moderate, solitary, sessile, round-ovoid, with about 6 more or less fringed or toothed scales, glossy chestnut brown.

XANTHORRHIZA APIIFOLIA (syn. *simpliocissima*) is recognized thus

SUMMER : a small, low shrub with bitter bark and yellow root; leaves alternate, clustered, long-stalked, 3-parted, incisely toothed, celery-like; flowers brownish-purple, very small, in terminal pendulous compound racemes; fruit a one-seeded follicle, dry and dehiscent.

WINTER : twigs terete, moderate, smooth; leaf scars alternate, low, shallowly U-shaped, more than half encircling the twig, with 10-12 bundle traces and no stipule scars; buds very unequal, the terminal bud enlarged, spindle-shaped, with about 5 mucronate scales, the lateral buds small, solitary, sessile, ovoid-oblong, compressed and appressed, with three blunt scales.

ZANTHOXYLUM AMERICANUM is recognized thus

SUMMER : aromatic shrub or small tree; young branchlets pubescent, with large prickles in pairs below the nodes; leaves alternate, pinnately compound with 5-11 leaflets; leaflets opposite, ovate or elliptic, acuminate, entire, pubescent beneath, with pellucid dots; flowers before the leaves, dioecious, small, yellow-green, in axillary fascicles on two-year wood; fruit blackish.

WINTER : aromatic or pungently acrid, armed with detachable paired prickles which are often widened at the base; twigs moderate or a little stout, terete, with a creamy white pith; leaf scars alternate, broadly triangular or 3-lobed, scarcely raised, with a conspicuous articular membrane, with three bundle traces and no stipule scars; buds small to moderate, rusty-red, woolly, superposed, sessile, globose, with indistinct scales.

| | | | | |
|-------------|----|--------------|----|-------------|
| XANTHOCERAS | -- | XANTHORRHIZA | -- | ZANTHOXYLUM |
|-------------|----|--------------|----|-------------|

KEY TO THE WOODY CLIMBERS WHEN IN FOLIAGE

- A. Leaves evergreen.
 - leaves opposite, oval-oblong, smallish, toothed, pinnately veined Euonymus
 - Leaves alternate, ovate, often lobed but not toothed, palmately veined or at least with 3 veins from the base . . . Hedera
- AA. Leaves deciduous.
 - B. Leaves opposite.
 - C. Leaves compound.
 - Climbing by aerial roots or by tendrils at the tip of the leaves Bignonia
 - Climbing by twining petioles or stems Clematis
 - CC. Leaves simple.
 - Climbs by twining stems or occasionally by aerial rootlets.
 - Sap milky Periploca
 - Sap not milky
 - Leaves entire, short-stalked or sessile Lonicera
 - Leaves toothed or lobed, distinctly petiolate.
 - Margin of leaves sparsely toothed, almost entire; leaf scars horseshoe-shaped Decumaria
 - Margin of leaves distinctly serrate; leaf scars crescent-shaped Hydrangea
 - Margin of leaves dentate; leaf scars C- or V-shaped Schizophragma
 - BB. Leaves alternate
 - D. Stems prickly.
 - Leaves compound, margin toothed; habit scrambling . . . Rosa
 - Leaves simple, parallel-veined, margin entire; climbing by paired tendrils Smilax
 - DD. Stems not armed.
 - E. Leaves compound.
 - F. Leaves palmately compound.
 - Leaflets 5, entire on the margin; climbs by twining Akebia
 - Leaflets 3-5, toothed on the margin; climbs by tendrils or adhesive discs; pith white . . . Ampelopsis
 - FF. Leaves pinnately compound.
 - G. Leaflets three.
 - Leaflets lobed or stipuled, lobes entire, hairy on the margin; fruit bean-like Pueraria
 - Leaflets sparsely and coarsely toothed; berries white (poisonous). . Rhus radicans
 - GG. Leaflets more than 3, short-stalked.
 - Margin entire Wisteria
 - Margin toothed Bignonia
 - EE. Leaves simple.
 - H. Leaves palmately veined.
 - Leaves more or less lobed but not toothed; fruit with a flattened, curved stone; twining.
 - Flowers with 6-8 petals and 12-24 stamens; leaves peltate Menispermum
 - Flowers with 6 petals and 6 stamens; leaves not peltate Cocculus
 - Leaves lobed and toothed.
 - Pith white; climbs by aerial rootlets and discs Ampelopsis
 - Pith brown; climbs by elongated tendrils, usually forked Vitis
 - Leaves not lobed nor toothed, - large, thin, ovate, flowers peculiar pipe-shaped Aristolochia

- HH. Leaves pinnately veined
 - I. Leaf margin entire
 - Leaves often hastately lobed or divided at the base; odor rank when crushed . . . Solanum
 - Leaves not lobed nor divided at the base; flowers and fruits small, in panicles Polygonum
 - II. Leaf margin toothed
 - Leaves large and coarse; marginal teeth bristle-tipped, petioles red Actinidia
 - Leaves moderate in size, finely toothed but not bristle-tipped Celastrus

KEY TO THE WOODY CLIMBERS IN WINTER

- A. Stems with prickles
 - Trailing or scrambling; prickles stout, curved; shoots terete and with a relatively large pith Rosa
 - Climbing by stipular tendrils or twining; prickles slender, black; tendrils also present; shoots angled and without pith, i.e. endogenous as in a cornstalk Smilax
- AA. Without prickles
 - B. Climbing by tendrils or twining petioles.
 - C. Climbing by tendrils only; tendrils forked, not thickened at tip; leaf scars alternate.
 - Hard-wooded, with much-flaking bark; pith brown Vitis
 - Soft-wooded, with bark not flaking or only slightly so; pith white Ampelopsis
 - CC. Petioles of leaves twining and assisting; stems strongly angled or ridged; leaves opposite, not disarticulating though dying Clematis
 - BB. Climbing by aerial rootlets or discs.
 - D. Leaf scars alternate.
 - Leaf scars 2-ranked, rounded, with many bundle traces in an ellipse, and with long, narrow stipule scars; pith white Ampelopsis
 - Leaf scars not 2-ranked nor rounded.
 - Leaf scars U-shaped; buds with about 2 fleshy scales; leaves evergreen Hedera
 - Leaf scars broadly crescent-shaped or shield-shaped; buds stalked and naked (poisonous) Rhus
 - DD. Leaf scars opposite.
 - Leaves evergreen Euonymus
 - Leaves deciduous
 - Leaf scars shield-shaped, with one C-shaped bundle trace and the buds connected around the twig by a hairy line; stems terete Bignonia
 - Leaf scars crescent-, U-, or horseshoe-shaped.
 - Buds with 4-6 outer scales; leaf scars crescent-shaped with 3 bundle traces Hydrangea
 - Buds with 2 outer scales; scars U-shaped with 5 bundle traces Schizophragma
 - Buds with indistinct scales; scars horseshoe-shaped with 3 bundle traces Decumaria
 - BB. Climbing by twining stems.
 - E. Leaf scars opposite
 - Buds nearly concealed by the leaf base; sap milky Periploca
 - Buds evident.
 - Stems warty; leaf scars low, $\frac{1}{2}$ -round, and connected by hairy, transverse ridges, with 1 bundle trace Bignonia
 - Stems smooth, hairy or glaucous; leaf scars small, crescent-shaped, on the narrowed ends of much-raised bases that are more or less connected by transverse lines, and with 1 bundle trace Lonicera
- EE. Leaf scars alternate.
 - F. Buds concealed.
 - Buds buried in the thickened cortex or swelling above the leaf scar Actinidia
 - Buds covered by the leaf scars; fruit with a ringlike or crescent-shaped stone.
 - Fruit red, stone transversely ribbed, compressed Cocculus
 - Fruit black, stone curved & crested on back Menispermum
 - FF. Buds evident
 - Buds superposed on a silky area in the arch of the U-shaped leaf scar Aristolochia
 - Buds not as above
 - G. Buds with mucronate scales

FF. Buds evident.

Buds superposed on a silky area in the arch of the
U-shaped leaf scar Aristolochia
Buds not as above.

G. Buds with mucronate scales.

Buds small, low, stout, subglobose, held at a
broad angle with the stem above the low leaf
scars, the latter with one bundle trace . . Celastrus

Buds ovoid, with numerous scales, directed
upward above the much raised leaf scars
with 3-6 bundle traces in a broken ellipse. .Akebia

GG. Bud scales not mucronate.

Bark of twigs loose and shredding, not hairy; nodes
very long; buds shrivelled and ragged with
very loose scales Polygonum

Bark firm, not loose nor shredding.

Buds narrowly oblong, acute at tip, and with
a hornlike or wartlike prominence at each
side of the base, giving them the appearance
of insects when held upside down; twigs
striped, not hairy, hard-wooded Wisteria

Buds not as above, twigs soft-wooded.

Twigs hairy and striped; leaf scars compara-
tively large, scarcely raised, with 2
bundle traces and large stipule scars;
buds flattened, thin Pueraria

Twigs not hairy; leaf scars much raised and
with one bundle trace and no stipule scars.

Solanum

ACTINIDIA ARGUTA is recognized thus

SUMMER : a glabrous, unarmed twiner; leaves alternate, simple, petiolate, broad-ovate to elliptic, pinnately veined, serrate with bristle-tipped teeth; petioles red; flowers dioecious, in cymes or solitary, white, cup-shaped, with purple anthers; fruit a berry.

WINTER : stems orange-brown, glabrous, with a brownish, chambered pith; leaf-scars alternate, round, rather large, much raised, with one bundle trace and no stipule scars; buds tiny, green, embedded in the cortex or in a swelling above the leaf scar; end-bud lacking.

AKEBIA QUINATA is recognized thus

SUMMER : a twining vine, unarmed, glabrous; leaves alternate, palmately compound with five leaflets, long-petioled; leaflets oval to oblong, entire, petiolate, rounded both ends or emarginate at the tip; flowers slender-stalked, fragrant, dark red-violet; fruit oblong, usually in pairs, seldom seen in cultivation.

WINTER : twigs slender, rounded, twining; leaf scars alternate, with 6 or more bundle traces in a broken ellipse, and no stipule scars, half-elliptic, much raised; buds evident, small, sessile, stout, ovoid, pointed, held at a broad angle to the stem, with 10-12 mucronate scales, sometimes branching from the axils of the lower scales.

ARISTOLOCHIA SIPHO (syn. durior) is recognized thus

SUMMER : an unarmed twiner; stems greenish, glabrous, somewhat striate; leaves alternate, simple, entire, large kidney-shaped to ovate, thin, palmately veined; flowers pipe-shaped, greenish marked bronze; fruit a 6-ribbed capsule.

WINTER : unarmed stems terete, green, swollen at the nodes; leaf scars alternate, U-shaped, a little raised, with three bundle traces and no stipule scars; buds evident, superposed on a silky area in the arch of the U-shaped scar, with few scales, silky.

ACTINIDIA -- AKEBIA -- ARISTOLOCHIA

The Genus *AMPELOPSIS* is recognized thus (including *Parthenocissus*)

SUMMER : leaves long-petioled, palmately 3-5 parted or lobed, about as broad as long; stems round or slightly angled and with a firm bark; fruit a berry borne in cymes.

WINTER : woody climbers by means of tendrils or modified tendrils or aerial rootlets; stems round or slightly angled and with a firm bark; pith white or greenish; leaf scars half-round or nearly circular, with numerous bundle traces arranged in an ellipse; bark firm and close with prominent lenticels.

Summer and Winter Keys combined

| species | tendrils | leaves | cymes | Young branchlets | leaflets | buds | fall color |
|---------------------|--|-----------------------------|----------------------------------|------------------|-------------------------------------|---|------------|
| <i>aconitifolia</i> | without adhesive discs | 5-parted | glabrous, fruit orange or yellow | glabrous | lanceolate | small, with several outer scales | no change |
| <i>heterophylla</i> | " | simple, 3-lobed | on pilose stalks, vari-colored | hairy | broadly ovate | " | " |
| <i>quinquefolia</i> | with 5-12 branches with adhesive discs, tendrils and internodes long | 5-parted | crowded into terminal panicles | round | green | rounded, not large; with 2-4 outer scales | vivid hues |
| <i>henryana</i> | " | " | " | square | with white markings, purplish below | " | " |
| <i>tricuspidata</i> | 5-12 adhesive discs, tendrils and internodes short | 3-lobed, simple or 3-parted | on short 2-leaved branchlets | squarish | green, purplish below | " | " |

N.B. varieties of *quinquefolia* and of *tricuspidata* are distinguished from the type by their foliage, viz.:-
quinquefolia engelmanni -- leaves smaller and more dense.
tricuspidata lowi -- leaves small, much curled
tricuspidata veitchii -- leaves lobed, not divided.

ARISTOLOCHIA SIPHO -- see preceding page.

AMPELOPSIS -- *ARISTOLOCHIA*

The Genus **BIGNONIA** is recognized thus

(syn. *Campsis*)

Summer : a vine climbing by aerial rootlets; leaves opposite, pinnately compound; leaflets serrate, short-stalked, elliptic to ovate-oblong, acuminate, cuneate; flowers orange to scarlet, in terminal cymes or panicles, showy and conspicuous; corolla tubular-funnel-form, with five rounded lobes; fruit a thick, almost bean-like pod which opens to disclose numerous winged seeds flattened about a central partition.

WINTER : a woody vine climbing by aerial rootlets; stems rounded, warty; leaf scars opposite, shield-shaped, low, with one C-shaped, compound bundle trace and no stipule scars but connected around the twig by hairy transverse ridges; buds rather small, usually solitary, sessile, triangular, compressed, ascending, with 2-3 pairs of outer scales.

Summer and Winter Keys combined

| species | leaflets | mode of climbing | floral color | capsule | twig |
|-------------|-------------------|--|--------------|-------------|------------|
| radicans | pubescent beneath | by twining and by aerial rootlets | orange | apex beaked | puberulous |
| grandiflora | glabrous beneath | twining; has few or no aerial rootlets | scarlet | apex obtuse | glabrous |

The Genus **CELASTRUS** is recognized thus

SUMMER : leaves alternate, petiolate, serrate, with small stipules; flowers in axillary cymes or terminal panicles, polygamo-dioecious, small, greenish, inconspicuous; fruit a yellow or orange capsule, dehiscent in 3 valves disclosing a fleshy crimson aril.

WINTER : Twigs moderate, twining; pith white, relatively large; leaf scars alternate, half-elliptic, low, with one transverse bundle trace and with very minute stipule scars or sometimes with the stipules remaining as tufted hairs; buds small, sessile, solitary, subglobose, with about 6 hard, mucronate scales.

Summer and Winter Keys combined

| species | flower and fruit clusters | leaves | fruit color | branches | scars |
|-------------|---------------------------|----------------------------------|---------------|-------------------------------|------------------------------|
| scandens | terminal | ovate | orange-red | lenticels scarcely noticeable | shield-shaped |
| orbiculatus | axillary | sub-orbicular, oblong or obovate | orange-yellow | lenticels very prominent | half-elliptical transversely |

BIGNONIA -- CELASTRUS

The Genus *CLENATIS* is recognized thus

SUMMER : leaves opposite, usually compound, rarely simple; flowers apetalous, sepals petaloid, stamens numerous, carpels many, becoming one-seeded achenes with a persistent, plumose style.
 WINTER : soft-wooded climbers with much angled or ridged stems, the ridges being over the vascular bundles and having a cavity in the cortex under the ridges; pith angled, white; leaf petioles persistent, not disarticulating though dying, and prehensile (i.e. serving the function of climbing tendrils), without stipules or stipule scars; buds small, with 1-3 pairs of outer, rather hairy scales.

Summer and Winter Keys combined

| species | stems | stem color | flowers | twigs | sepals | leaflets |
|----------------------|---------------------------------|---------------|------------|---------------------|---|--|
| paniculata | 12-18
ridged | straw-colored | monoecious | | | entire, or
occasionally lobed |
| virginiana | 6 primary
ridges
stronger | brown | dioecious | finely
pubescent | | ovate, variously few-toothed
or coarsely dentate |
| lawsoniana
henryi | " | " | monoecious | " | 4-6, ovate
or elliptic,
overlapping
leaflets | ovate-lanceolate, acuminate,
simple or with three
leaflets |
| jackmanni | " | " | " | glabrate | 4-6 obovate | ovate, acute, ternate
or pinnate |

COCULUS CAROLINUS is recognized thus

SUMMER : an unarmed climber with pubescent branchlets; leaves alternate, simple, palmately veined, entire or shallowly 3-5 lobed, orbicular to triangular-ovate, obtuse and mucronulate at the tip, rounded at the base, pubescent and glaucescent beneath, glabrous above, rather long petioled; flowers dioecious, small, in short or sometimes spike-like panicles, with six petals and six stamens; fruit subglobose, red drupes with the stones curved, compressed, and transversely ridged.

WINTER : stems greenish to tan, twining, fluted, slender, terete; leaf scars alternate, elliptical, raised, concave, with 3-7 bundle traces and no stipule scars; buds small, hairy, superposed, the upper developing inflorescence, the lower covered by the leaf scars, with about three indistinct scales.

DECUMARIA BARBARA is recognized thus

SUMMER : a deciduous or sub-evergreen climber by aerial rootlets; bark peeling; leaves opposite, petiolate, ovate to elliptic, entire or sparsely toothed, acute, glabrous, stipulate, lustrous above; flowers in rounded, terminal corymbs, white, small; fruit an urn-shaped capsule, ribbed between the seeds.

WINTER : climbing by aerial rootlets; stems slender, round, exfoliating; pith greenish; leaf scars opposite, horseshoe-shaped, raised, concave, connected by a line around the twig, with three bundle traces and no stipule scars.

COCULUS -- CLENATIS -- DECUMARIA

The Genus LONICERA is recognized thus

SUMMER : twining, woody vines; leaves opposite, short-petioled or sessile, entire, sometimes connate, without stipules; flowers short-pedicelled in axillary pairs or in sessile terminal whorls; fruit a berry.

WINTER : woody vine which climbs by twining; subevergreen; twigs rounded, slender; leaf scars opposite, crescent-shaped, small, on the extremities of raised bases which are more or less connected by lines around the twig, with three bundle traces and no stipule scars; buds often superposed, the lowermost largest and developing inflorescence, sessile, with 2 to numerous 4-ranked scales.

Summer and Winter Keys combined

| species | leaf color | leaves | flowers | fruits | stems |
|--------------|----------------------|-------------------|--|--------|---------------------|
| japonica | deep rich green | oval | white to yellow | black | pubescent, grayish |
| sempervirens | blue-green, glaucous | ovate and connate | trumpet-shaped, red outside, yellow within | red | glabrous, yellowish |

MENISPERMUM CANADENSE is recognized thus

SUMMER : a twiner with a persistent root and woody base but the upper growth less persistent; young growth pubescent; leaves orbicular, the petiole attached inside the margin, long-petioled, entire or shallowly 3-7 lobed, acute or obtuse, glabrescent; flowers small in loose panicles, not peduncled; fruit a subglobose drupe, blue-black, with a crescent-shaped stone crested on the back.

WINTER : semi-woody twiner; twigs round, fluted, slender, with a relatively large, white pith; leaf scars alternate, elliptical, concave on the face, and raised at the edges, with 3-7 bundle traces and no stipule scars; buds small, hairy, superposed, with the uppermost developing inflorescence and the lower covered by the leaf scar, with about 3 indistinct scales; fruit sometimes persisting, with a crescent-shaped stone crested on the back.

PERIPLOCA GRAECA may be recognized thus

SUMMER : a strong climber with glabrescent twigs; leaves opposite, ovate or elliptic to oblong-lanceolate, long acuminate, lustrous, entire; flowers in axillary or terminal cymes, greenish-yellow outside, purplish within; calyx glandular inside; fruit of two cylindric follicles cohering at the apex.

WINTER : a soft-wooded climber; sap milky; stems terete, twining; pith excavated; leaf scars opposite, raised, shrivelled or elliptical, with one crescent-shaped bundle trace and no stipule scars; buds small, solitary, almost concealed by the much raised leaf bases.

LONICERA -- MENISPERMUM -- PERIPLOCA

PARTHENOCISSUS -- see Ampelopsis

The Genus POLYGONUM is distinguished thus

SUMMER : Leaves with tubular or sheath-like stipules, alternate, simple, ovate, entire, pinnately veined, lustrous, slender-petioled; flowers small, in racemes collected into small panicles, white or pinkish, showy because so profuse; fruit a small achene, triangular, enclosed by the persistent perianth.

WINTER : unarmed, twining woody climbers with jointed stems; bark loose and shredding; nodes very long; stems glabrous, green striped, slender, often dying back at the top; leaf scars alternate, crescent-shaped, narrow, with 3 bundle traces and narrow-linear stipule scars connected by a line around the twig; buds evident, shrivelled and ragged with thin, very loose scales; fruit more or less persistent, a small, triangular achene enclosed by 3 bracts and borne in racemes or panicles.

| species | inflorescence | floral color | fruit |
|----------------|------------------------------------|--------------|-------------------|
| auberti | erect, minutely scabrous-pubescent | white | scarce or lacking |
| baldschuanicum | drooping, nearly glabrous | pinkish | profuse, large |

PUERARIA THUNBERGIANA is recognized thus

SUMMER : a twining, high-climbing, unarmed vine of very rapid growth; root a fleshy tuber; leaves alternate, pinnately compound, 3-parted, stipulate; leaflets large, often lobed, stipellate, margin entire, hairy; flowers blue-violet, pea-like, in long dense, axillary racemes; bracts and bractlets small, soon drooping; fruit an elongated, 2-valved, bean-like pod.

WINTER : bark firm, branchlets striped, soft-wooded, hairy, dying back to the base in winter, internodes long; root persistent, fleshy, tuberous; leaf scars alternate, scarcely raised, comparatively large, with 2 bundle traces and large stipule scars; buds flattened, thin, scales obtuse or acute.

SCHIZOPHRAGMA HYDRANGEOIDES is recognized thus

SUMMER : a vine climbing by aerial rootlets; bark of the older branches with longitudinal fissures; leaves opposite, long-petioled, broadly ovate, sparsely and coarsely dentate, short-acuminate, cordate, nearly glabrous, estipulate; flowers small, whitish, in loose, peduncled corymbs margined with sterile flowers having a single large white sepal; fruit a conical, ribbed capsule containing many seeds.

WINTER : stems brown, rather slender; bark finally splitting longitudinally and peeling; leaf scars opposite, U-shaped, raised, nearly meeting, with 5 bundle traces and no stipule scars; buds smallish, developing into short spurs, solitary, with 2-4 outer scales which are golden-brown, pubescent, and inclined to be ciliate; end-bud somewhat enlarged.

PARTHENOCISSUS -- PUERARIA -- SCHIZOPHRAGMA

The Genus *SHILAX* is recognized thus

SUMMER : woody climbers with paired tendrils on the base of the petiole; those on the list given below all having distinct but narrow stipules with tendrils; stems often prickly, little branched at the base; lower leaves much reduced, upper leaves entire or sometimes slightly 3-lobed, with parallel veination; flowers dioecious, small, inconspicuous, in axillary umbels; fruit a small, black berry with 1-to several seeds.

WINTER : a vine climbing by tendrils, armed with straight, often strong prickles; stems terete or angular, the woody fibers embedded in the pithy stalk as in a cornstalk i.e. endogenous; leaves tearing away above the clasping base, thus leaving no definite scar but carrying 10-12 vascular bundles, the stipules or their equivalent persisting as tendrils on these leaf bases; buds triangular, pointed, widely divergent, with one bud-scale, enclosed in the remnant of the leaf base.

Summer Key

| species | leaves | fruits | peduncles | fruit seeds |
|---------------------|-------------------------|----------------------|---------------------------|-------------|
| <i>glauca</i> | very glaucous below | bloomy | much longer than petioles | 3-seeded |
| <i>hispidā</i> | glabrous or glabrescent | not bloomy | " | 1-seeded |
| <i>rotundifolia</i> | " | not bloomy, lustrous | shorter than petioles | 3-seeded |

Winter Key

| species | stems | stem color | prickles |
|---------------------|--------------|------------|---------------------------------------|
| <i>glauca</i> | glaucous | brownish | few |
| <i>hispidā</i> | not glaucous | green | stout, flattened at base, dense below |
| <i>rotundifolia</i> | not glaucous | green | needle-like, black, few |

SOLANUM DULCIMARA is recognized thus

SUMMER : a scrambling shrub; branches sometimes spiny; leaves alternate, simple or compound, ovate to ovate-oblong, entire, lobed at the base, acuminate, cordate, puberulent, petiole short to moderate; flowers in cymes, rarely solitary, shallow-bell-shaped, with connivent anthers like a potato blossom; fruit an ovoid, scarlet berry in drooping clusters. Fruits are said to be poisonous.

WINTER : a soft-wooded scrambler, slightly inclined to twine; stems slender, somewhat angular or terete, pith large, greenish, spongy; leaf scars alternate, $\frac{1}{2}$ -round, much raised, with one rather large bundle trace and no stipule scars; buds subglobose, small, solitary, sessile, with 4 hairy, obtuse outer scales; vestiges of fruit clusters often remaining, opposite the leaf scars or beside the axils.

The Genus VITIS is recognized thus

SUMMER : Woody vines climbing by means of tendrils; pith brown, usually interrupted at the nodes by diaphragms; leaves alternate, simple, coarsely dentate, usually lobed; flowers in panicles opposite the leaves; fruit a pulpy 2-4 seeded berry borne in dense panicles.

Summer Key

| species | basal sinus of leaves | under side of leaves | leaf form | tomentum | tendrils | branchlets |
|------------|---|--|---------------------------------|--|----------------|-------------------|
| cordifolia | narrow; leaves ovate, undivided or slightly 3-lobed | green and glabrous or slightly pubescent | | | | terete, glabrous |
| vulpina | wide; leaves broader | " | | | | |
| aestivalis | lobes often overlapping | floccose * | deeply lobed with round sinuses | flocculent or cobwebby or glaucous below | intermittent** | terete |
| coignetiae | indistinct | " | not or indistinctly lobed | brownish floccose | " | " |
| cinerea | open, wide | " | " | grayish floccose | " | distinctly angled |
| labrusca | open | densely and persistently brown tomentose | slightly 3-lobed | brown, dense | continuous*** | terete |

* with bunches of soft hair or wool

** often skipping a node

*** one at each node

VITIS -- Summer Key

The Genus VITIS is recognized thus

WINTER : woody climbers with forked tendrils opposite the leaf scars; bark shredding in long strips, without lenticels; pith brown; twigs striate or angled; leaf scars alternate, 2-ranked, half-round or crescent-shaped, with several bundle traces arranged in a C and with long, narrow stipule scars; buds subglobose, with two broad scales, collaterally branching; end-bud lacking.

Winter Key

| species | twig bark | twigs | tendrils | nodal diaphragms | fruit panicles |
|------------|----------------|-------------------|-----------------|------------------|-----------------------------|
| cinerea | gray woolly | distinctly angled | intermittent | | |
| coignetiae | brown woolly | distinctly angled | intermittent | | |
| labrusca | | nearly terete | continuous * | | |
| vulpina | | " | intermittent ** | thin | |
| cordifolia | | " | " | thick | vestiges open and large |
| aestivalis | brown floccose | " | " | " | vestiges compactly branched |

* one at each node

** often skipping a node

VITIS -- Winter Key

The Genus *WISTERIA* is recognized thus

SUMMER : woody twiners; leaves pinnately compound, with 9-19 leaflets with stipules soon falling, alternate; leaflets shortly petioled, alternate, stipellate, flowers light purplish or white, pea-like, in long racemes, the flowers opening from base to apex gradually; fruit an elongated bean-like pod, somewhat contracted at intervals.

WINTER : woody vines which climb by twining; stems moderate, slightly fluted; leaf scars alternate, transversely elliptical, much raised, and with a horn- or wart-like protuberance on each side at the base, so that bud and scar together have the appearance of an insect when viewed upside down, with one bundle trace and no stipule scars; buds medium to medium-large, solitary, sessile, narrowly oblong and acute at the tip and nearly surrounded by the outer scale.

Summer and Winter Keys combined

N.B. *Wisteria* species are difficult to distinguish in winter, but possible if one have fruits as well as twigs.

| species | leaflets | branchlets | fruit pods | flower clusters |
|-------------------|---------------------|-----------------------|---|---------------------------------|
| <i>floribunda</i> | 13-19 | slightly pubescent | velvety, 10-15 cm. long, narrowed near the base | very long |
| <i>frutescens</i> | usually fewer, 9-13 | glabrous or nearly so | glabrous, 5-10 cm. long, compressed | racemes 4-5" or less in length |
| <i>sinensis</i> | " | pubescent | 10-15 cm. long, densely velutinous, 1-3 seeded | racemes 6-12" or more in length |

WISTERIA

KEY TO THE HARDY BROAD-LEAVED EVERGREENS

- A. Climbing by aerial rootlets.
 - Branchlets terete; leaves alternate, lobed or broadly ovate, margin entire Hedera
 - Branchlets square or 4-angled; leaves opposite, ovate to obovate or narrow-elliptic, margin toothed Euonymus
- AA Not climbing.
 - B. Leaves whorled.
 - Leaves small, linear, revolute, regularly whorled Erica
 - Leaves larger, oblong-obovate, serrate, in irregular whorls Chimaphila
 - BB. Leaves opposite.
 - Leaves scalelike, 4-ranked, keeled, auricled at the base; corolla 4-parted, persistent; flowers in terminal spikes Calluna
 - Leaves ordinary, not scalelike.
 - C. Leaf margin entire.
 - Habit prostrate Vinca
 - Habit erect.
 - D. Branchlets square; leaves ovate to oblong; buds with several scales Buxus
 - DD. Branchlets terete; leaves oblong to elliptic, revolute, not dotted; buds with two outer scales Kalmia
 - CC. Leaf margin serrate or serrulate.
 - Branchlets square or 4-angled.
 - With very small linear or narrow-oblong leaves, somewhat revolute and finely serrate above the middle Pachistema
 - With broader, lustrous leaves, ovate to obovate or narrow-elliptic Euonymus
 - Branches terete and tomentose; leaves large and strongly wrinkled, and tomentose beneath Viburnum
(see shrub keys)
 - BBB. Leaves alternate.
 - E. Leaves pinnately compound.
 - Prostrate half-evergreen, armed with strong prickles . . Rosa
 - Erect, evergreen, unarmed; leaves spinose-dentate . . Mahonia
 - EE. Leaves simple.
 - Leaf margins sinuately spiny; some leaves 3-foliolate . . Berberis
 - Leaves not as above.
 - A low plant with obovate leaves 3-nerved at the base and dentate Pachysandra
 - Leaves not obovate or not 3-nerved at the base.
 - Branches thorny Pyracantha
 - Branches not thorny.
 - F. Habit prostrate, creeping or trailing.
 - Leaves and stems bristly with rusty hairs; leaves oval, rounded or heart-shaped; flowers salverform in terminal clusters, very fragrant Epigaea
 - Not as above
 - Stems creeping on or below the surface sending up sparse erect branches with a few leaves at the tip; leaves glossy dark green, obscurely serrate and with a spicy-aromatic flavor . . Gaultheri
 - Stems trailing; leaves with margin entire and without the spicy-aromatic flavor.
 - Leaves narrow, oblanceolate, glaucous beneath, with a sharp-pointed tip; branches pubescent Daphne
 - Leaves broader, obovate-oblong, thick, with finely impressed veins, wedge-

- shaped at the base, and with
the tip obtuse or retuse; bark
exfoliating Arctostaphylos
- FF. Habit erect.
Leaves fragrant when crushed, slightly
rugose above, and densely brown-
tomentose beneath, tip very obtuse . Ledum
Not as above.
- G. Leaves toothed on the margin.
Leaf margins with spiny teeth Ilex
Marginal teeth not spiny, margins
serrulate or obscurely toothed.
Leaves glandular black-dotted beneath . . .
Pieris
Not glandular beneath.
Leaves covered with scurfy scales
beneath; margin obscurely
denticulate Chamaedaphne
Leaves not scurfy-scaly beneath,
conspicuously petiolate, broadly
lanceolate, acuminate; marginal
teeth bristle-tipped . . . Leucothoe
- GG. Margins entire.
Leaves linear and revolute Andromeda
Leaves not linear.
- H. Leaves lighter beneath.
Under side yellowish; leaves
cuneate and revolute . . Kalmia
Under side whitish; leaves ellip-
tic to oblong.
Evergreen Rhododendron
Deciduous Azalea
- HH. Leaves green beneath or hairy,
rounded or oval Cotoneaster
(see deciduous shrubs)

The Genus AZALEA is recognized thus

SUMMER : upright shrubs; leaves alternate, short-petioled, entire or ciliate; flowers from leafless terminal or lateral buds; lateral buds clustered at the ends of branchlets; corolla funnel-form; stamens 5-10, more or less exserted; fruit a capsule.

| species | flowering season | foliage | young bark | branchlets | under side of leaves | corolla tube | twigs | corolla | shape of leaves | upper side of leaves |
|--------------------|--------------------------|-----------------|---|----------------------------|--|-------------------------------------|-----------------------|----------------------------------|--------------------------|----------------------|
| amoena (obtusum) | before the leaves | sub-evergreen | with flat chaff-like scales rather than hairs | | | shorter than the lobes | | | obtuse | |
| mucronulatum | " | " | " | glabrate | pale with scattered glands | | glabrate | puberulous | broadest near base acute | |
| kaempferi | " | deciduous, thin | " | | | shorter than the lobes | | | | |
| japonicum | " | " | not chaffy-scales, but pubescent or glandular | glabrous | bristly on veins | " | | | | |
| (canescens) roseum | " | " | " | finely pubescent | gray-pubescent | " | | | | |
| nudiflorum | " | " | " | pubescent | glabrous except midribs | as long as or longer than the lobes | | | | |
| vaseyi | " | " | " | puberulous | " | shorter than the lobes | | | | |
| arborescens | with or after the leaves | " | " | glabrous | glabrous | as long as or longer than the lobes | glabrous | white | broadest near tip | glabrous |
| viscosum | " | " | " | with stiff appressed hairs | hairy appressed bristles on midrib | " | hairy and sticky | usually white viscid & glandular | " | " |
| calendulaceum | " | " | " | pubescent | pubescent | " | pubescent | fiery red | " | finely pubescent |
| canadense * | " | " | " | puberulous, often bloomy | hairy, sparingly glandular on midrib or glaucous | shorter than the lobes | puberulous when young | rose purple | broadest at middle | slightly pubescent |

*Rhodora canadense Although deciduous, Azalea is placed in this section because of its very close relation to Rhododendron

AZALEA -- Summer Key

The HARDY AZALEAS are recognized thus

WINTER : erect shrubs with deciduous leaves; twigs moderate, terete; pith rather small, slightly colored, continuous; buds solitary, sessile, clustered above thus causing the branches to cluster near the end of the season's growth; upper buds enlarged, ovoid, with about 6 ciliate scales; flower buds still larger; lower buds increasingly smaller and with fewer scales; leaf scars alternate, low, shield-shaped, notched or straight at the top, with one bundle trace and no stipule scars; fruit often persistent, oblong, 5-valved capsules.

N.B. See key to Rhododendron

| species | foliage | twigs | leaf scars | pedicels | flower buds | branchlets | buds | capsules | bud color |
|------------------|-----------------|--|--------------------------|-------------------------|--|----------------------------|----------------------------------|-------------------------|-----------|
| amoena (obtusum) | sub-evergreen | with flat, chaffy-like scales rather than hair | | | | | | | |
| kaempferi | deciduous, thin | " | | | | | | | |
| mucronulatum | " | " | low | scaly | | buff-orange | glandular-dotted | | |
| vaseyi | " | not chaffy-scaly but pubescent or glandular | raised, scarcely notched | | | | glandular | | |
| japonicum | " | " | not raised | tomentulose & glandular | | glabrous, sometimes setose | " | | |
| canadense | " | " | " | sparsely long-hairy | of a few scales which often drop early | puberulous | puberulous | | |
| roseum | " | " | " | glandular | of numerous much-imbriated scales, pubescent | | | | |
| arborescens | " | " | " | glabrous | " | entirely glabrous | glandular | | |
| viscosum | " | " | " | bristly | " | glabrate or glandular | puberulous with spreading glands | | |
| nudiflorum | " | " | " | " | " | " | glandular with ascending hairs | rosy | |
| calendulaceum | " | " | " | sparsely long-hairy | " | sparsely long-hairy | " | glabrous, not glandular | brown |

AZALEA

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Winter Key

The Genus *BUXUS* is recognized thus

evergreen shrubs or small trees; twigs slender, green, flat-grooved between each pair of leaves; leaves opposite, small, leathery, almost elliptical, entire, short-petioled, glabrous, with one main vein; buds sessile, solitary, small, ovoid, with 2-4 scales; flower-buds larger and multiple; leaf scars minute, raised, crescent-shaped, with one bundle trace and no stipule scars; flowers small, inconspicuous, in axillary or terminal clusters; fruit an obovoid, 3-horned capsule with two lustrous black seeds.

| species | variety | leaves | branchlets | flowers | habit |
|---------------------|-------------------|---|----------------------------|-----------------------|-------|
| <i>sempervirens</i> | | elliptic to lance-oblong; broadest at or below the middle | usually a little pubescent | axillary clusters | |
| <i>microphylla</i> | <i>myrtifolia</i> | small, elliptic-oblong | | | low |
| | | obovate to oblong-obovate broadest above the middle | usually glabrous | mostly terminal | |
| | <i>koreana</i> | obovate, emarginate, pubescent on the midrib above | softly pilose | axillary and terminal | |

CALLUNA VULGARIS is recognized thus

a small evergreen shrub; leaves opposite, scalelike, 4-ranked, keeled, sessile, auricled at the base; oblong-ovate, puberulous or nearly glabrous; flowers pink in dense racemes or terminal spikes, corolla 4-parted, persistent; fruit a 4-valved capsule; twigs very slender, rounded; buds solitary, sessile, small, globose and angular, with about 3 outer scales.

CHAMAEDAPHNE CALYCULATA is recognized thus

A low erect shrub with numerous spreading branches, bushy and unarmed; leaves alternate, simple, obovate to oblong, scurfy, short-petioled, revolute, obscurely toothed or nearly entire, with one main vein; flowers white, short-pedicelled, in terminal, nodding, leafy racemes on the under side of the branches; fruit a dehiscent capsule; twigs slender, with a shredding gray bark, finally smooth, red-brown.

CHIMAPHILA UMBELLATA is recognized thus

a small, low-growing, half-shrubby or herbaceous plant with long, running underground stems sending up leafy shoots tufted with leaves at the top; leaves whorled, moderate size, oblong-obovate, serrate, short-petioled, thick and shining; flowers in nodding, terminal, stalked clusters, white or reddish; fruit a globose capsule.

BUXUS -- CALLUNA -- CHAMAEDAPHNE -- CHIMAPHILA

The Genus DAPHNE is recognized thus

Evergreen or deciduous shrubs; winter buds with several outer scales; leaves alternate, rarely opposite, short-petioled, entire, simple, narrow, oblanceolate, with one main vein, acute, glaucous-cent beneath; flowers perfect, apetalous, in terminal or axillary short racemes or umbels, usually with bracts; calyx tube campanulate to cylindric, usually 4-lobed, corolla-like, usually pubescent on the outside; stamens 6-10 in two rows, included; stigma capitate, sessile, or on a short style; ovary without disk at the base, or a ringlike disk, or one entire scale; fruit a leathery or fleshy one-seeded drupe.

| species | leaves | corolla | habit | flowers |
|----------|----------------------------------|------------------------------|--------------------------------|-------------------------|
| mezereum | deciduous, alternate
glabrous | silky-pubescent | erect to 3' or 4' | axillary along old wood |
| cneorum | evergreen | densely pubescent
outside | low or procumbent
1' to 1½' | in terminal heads |

EPIGAEA REPENS is recognized thus

a prostrate plant, carpeting the ground; leaves and stems bristly with rusty hairs; twigs slender; leaves alternate, simple, oval to elliptical-ovate, with one main vein, entire and ciliate, short-petioled; flowers in terminal clusters, white tinged pink, very fragrant, 5-lobed; fruit a capsule, globular, splitting into a 5-parted rosette with a fleshy, berry-like interior.

DAPHNE -- EPIGAEA

The Genus *ERICA* is recognized thus

a low, spreading shrub, often forming matlike growths; leaves small, linear, revolute, petiolate, regularly whorled, mostly longer than the internodes of the very slender stems; flowers pink or white, in terminal spikes or panicles; fruit a 4-valved capsule, ovoid or subglobose, enclosed in the persistent corolla.

| species | anthers | leaves and calyx tubes | branchlets | inflorescence | location of anthers | sepals | sepal form | leaves |
|-----------|----------------|------------------------|-------------------------------------|------------------------------------|--------------------------|-------------------------------|------------|----------------|
| tetralix | appendaged | conspicuously ciliate | minutely villous, glandular hirsute | terminal, umbel-like | | | | |
| ciliaris | not appendaged | " | densely pubescent | terminal spikes | | | | |
| cinerea | appendaged | glabrous | finely pubescent | terminal racemes or panicles | | | | whorled in 3's |
| scoparius | not appendaged | " | glabrous | axillary, cylindrical spikes | included in corolla tube | | | |
| vagans | " | " | " | lateral | exserted | less than long as the corolla | ovate | |
| carnea | " | " | " | axillary, forming terminal racemes | " | more than long as corolla | lanceolate | |

GAULTHERIA PROCUMBENS is recognized thus

a low, tufted, spreading plant with a procumbent stem, spreading by creeping roots; leaves alternate, simple, oval, entire, with a spicy-aromatic flavor, glossy deep green, with one main vein, obscurely serrate, glabrous, short-petioled; flowers axillary, urn-shaped, nodding, pinkish-white; fruit a bright red, spicy-flavored berry, nearly globular, slightly 5-lobed at the top.

HEDERA HELIX is recognized thus

a vine creeping or climbing by small rootlets at the nodes; branchlets terete, nodes long; leaves alternate, lobed or broadly ovate, margin entire; flowers in globose umbels terminal on high-climbing branches, inconspicuous; fruit a 3-5 seeded drupe, black, and berrylike, not formed in northern states.

ERICA -- *GAULTHERIA* -- *HEDERA*

The Genus *ILEX* is recognized thus
 evergreen or deciduous shrubs or trees; leaves alternate, simple, moderate in size, stipular, odorless, often spiny-toothed; twigs smooth dark gray marked lighter gray, lenticular, somewhat angular, often spurlike, with crowded leaf scars; buds small, sessile, broadly ovoid, usually superposed, with 2-6 outer scales; flowers solitary and axillary or fasciated in cymes, 4-merous; fruit a small drupe with several bony nutlets; leaf scars crescent-shaped, raised, clustered near ends of twigs but with longer internodes on older growth, with one bundle trace and minute stipule scars or persistent stipules.

| species | leaves | flowers and fruits | fruit color | leaf margin | flowers | leaf apex |
|---------------------|-----------|---|-------------|--|------------|---------------|
| <i>verticillata</i> | deciduous | | | | | |
| <i>aquifolium</i> | evergreen | axillary on last year's branchlets, usually clustered | | spiny with large triangular teeth | | |
| <i>opaca</i> | " | solitary or in solitary peduncled clusters axillary on young branchlets | red | coarsely spiny-toothed | | |
| <i>glabra</i> | " | " | black | with few obtuse teeth near apex or entire | 5-8-merous | obtuse |
| <i>crenata</i> | " | " | " | serrate or crenate, only a few teeth near the apex | 4-merous | sharp-pointed |

The Genus *KALMIA* is distinguished thus

evergreen undershrubs, poisonous in all parts; twigs moderate, gray; leaf scars clustered on new growth but with longer internodes on older wood, shield-shaped, with a linear bundle trace and no stipule scars; buds with two outer scales; leaves alternate, opposite or whorled, petiolate, entire; flowers in terminal or lateral corymbs, corolla saucer-shaped with ten small pouches which hold the anthers bent over into them, the latter springing up suddenly to discharge pollen when touched; fruit a 5-valved dehiscent capsule containing numerous minute seeds.

| species | arrangement | leaf tip | leaves | inflorescence | pod | flowers |
|---------------------|--------------------|----------|----------------------|--------------------|--------------------------|----------|
| <i>latifolia</i> | mostly alternate | acute | distinctly petioled | compound (corymbs) | depressed glandular | terminal |
| <i>angustifolia</i> | opposite or in 3's | obtuse | short-petioled | compound | depressed, nearly smooth | lateral |
| <i>polifolia</i> | " | " | sessile or nearly so | simple (umbels) | ovoid, smooth | terminal |

LEDUM GROENLANDICUM is recognized thus

a dwarf evergreen shrub twigs rusty-tomentose, slightly triangular; leaves alternate, simple, oblong entire, revolute, fragrant when crushed, slightly rugose above, densely brown tomentose beneath; leaf scars minute, slightly raised, triangular, with one bundle trace and no stipule scars; buds small, solitary, sessile, conical or globose, with 2-3 outer scales; flowers white in largish terminal umbel-like clusters, showy, puberulous; fruit an oblong capsule, more or less persistent.

LEUCOTHOE CATESBAII is recognized thus

An arching under-shrub; twigs reddish and puberulous when young; leaves alternate, simple, lanceolate, lustrous, leathery, slightly spinulose-toothed, short-petioled, lighter on the under side, acuminate; leaf scars small, crescent-shaped, scarcely raised, with one bundle trace and no stipule scars; buds small, globose, solitary, sessile, with 3-4 outer scales; end-bud lacking; flowers white, rarely pink, in sprays or loose axillary racemes drooping below the branches, very fragrant; fruit a subglobose 5-lobed capsule, often persistent.

MAHONIA AQUIFOLIUM is recognized thus

an erect unarmed shrub; twigs smooth, slightly glaucous, rather stout; leaves alternate, pinnately compound, spinose-dentate; leaflets 5-9, ovate to oblong-ovate, stiff and leathery; leaf scars narrow, low, half-encircling the twig, with numerous bundle traces and no stipule scars; buds smallish with about 6 outer scales; terminal bud enlarged; flowers yellow racemose, in showy terminal masses; fruit a small, glaucous, blue berry.

| | | | | |
|-------|----|-----------|----|---------|
| LEDUM | -- | LEUCOTHOE | -- | MAHONIA |
|-------|----|-----------|----|---------|

PACHISTIMA CANBYI is recognized thus

a low shrub; twigs square or 4-angled, inclined to be warty; bark becoming rather corky and checked; leaves opposite, small, linear or narrow-oblong, somewhat revolute, serrulate above the middle, short-petioled; leaf scars minute, crescent-shaped, slightly raised, with one indistinct bundle trace and no stipule scars; buds solitary, sessile, ovoid, appressed, very small, with 2 outer scales; flowers small, axillary, 4-merous, in few-flowered cymes; fruit a 2-valved capsule.

PACHYSANDRA TERMINALIS is recognized thus

evergreen, procumbent plants with fleshy stems and matted creeping rootstalks; glabrous; leaves tufted at the top of the short stems, alternate, simple, obovate, coarsely dentate, acute, cuneate, 3-nerved at the base; flowers tiny, whitish, in inconspicuous terminal spikes; fruit a 3-horned whitish drupe.

PYRACANTHA COCCINEA is recognized thus

a low, horizontally spreading shrub of very irregular outline, armed with slender, spreading, purple spines; buds small, sessile, solitary or collaterally branched in spine formation, broadly ovoid, pubescent, with about 6 outer pointed scales; leaves alternate, simple, narrow-elliptic to lanceolate to oblanceolate, acute, cuneate, toothed or entire, short-petioled, glabrous; leaf scars crescent-shaped or 3-lobed, with three bundle traces and minute stipule scars; flowers white in compound corymbs; fruit a small pome with a persistent calyx, subglobose, orange-red.

The variety **LALANDI** is more vigorous in growth, has more slender branches, the leaves more deeply notched, and the orange-red fruits more profusely produced.

The variety **ROYALI** is almost identical with **lalandi** except in hardiness. It is said to withstand a temperature twenty degrees below zero.

| | | | | |
|------------|----|-------------|----|------------|
| PACHISTIMA | -- | PACHYSANDRA | -- | PYRACANTHA |
|------------|----|-------------|----|------------|

The Genus *PIERIS* is recognized thus

twigs rather slender, 3-sided becoming terete; leaves alternate, simple, short-petioled, entire and revolute or serrulate; leaf scars small, half-round or triangular, somewhat raised, with one bundle trace and no stipule scars; buds small, ovoid to conical, with 2-5 outer scales; end-bud lacking; flowers in terminal panicles, 5-merous; fruit a small, globose or urn-shaped dehiscent capsule.

| species | branchlets | flower-clusters | inflorescence | leaves |
|------------|---------------|-----------------|---|---------------------------|
| floribunda | bristly-hairy | upright | terminal panicles | acute, obtuse at the base |
| japonica | glabrous | drooping | terminal panicles | acute, obtuse at the base |
| mariana * | glabrous | nodding | axillary fascicles forming terminal leafless racemes (racemose fascicles) | obtuse, base cuneate |

* syn. *Lyonia mariana*

PIERIS

The Genus RHODODENDRON is recognized thus

shrubs, rarely trees; buds with overlapping scales; leaves evergreen, alternate, large, petiolate, entire; flowers colorful, in terminal, umbel-like clusters or racemes, sometimes solitary or few; rarely from lateral buds, pedicelled; calyx usually 5-parted; corolla a little irregular, 5-parted or more; stamens 5-10, anthers opening at the tip; capsule ovoid to oblong, opening between the cells; seeds minute, numerous.

Rhododendrons are so numerously hybridized as to be embarrassing to the student. To give a record that would be anywhere near complete is manifestly impossible in the scope of this key, nor we do consider it desirable at this time. Only the more important hardy native species available for landscape use are here given.

As distinguished from Azaleas, the Rhododendrons have leathery, persistent leaves, 10 stamens rarely projecting beyond the corolla; leaves alternate, simple, entire; plant unarmed.

RHODODENDRON -- leaves evergreen, leathery, persistent; corolla campanulate; stamens and style rarely exerted.
AZALEA Leaves deciduous, glandular mucronate; corolla funneliform; stamens and style more or less exerted.

| species | foliage | leaf tip | pedicels | leaves |
|-------------|-----------|----------|-------------|---|
| maximum | evergreen | acute | viscid | acute, 4-10" long, thinly scurfy-tomentose, rarely glabrous |
| catawbiense | evergreen | rounded | rusty-downy | obtuse or obtusish, 3-5" long, glabrous, pale on the under side |

VINCA MINOR is distinguished thus

an evergreen, trailing subshrub, rooting at the nodes; leaves opposite, 4-ranked, ovate, lobed on the immature growth, entire, stipulate, dark green, the veins whitening effectively in winter; flowers violet-blue, the corolla salverform; stamens fastened to the middle of the corolla tube; fruit of two dehiscent, cylindric follicles.

RHODODENDRON -- VINCA

CONIFER GENERA

| Genus | character | leaf arrangement | leaves | leaf blade | leaf base | branchlets | winter buds | fruits |
|------------------------------|-----------|---------------------------------|---|--------------------------------------|---------------------------|--|---|--------------------------------------|
| Taxodium
Bald Cypress | deciduous | spreading in 2 ranks or rows | | | | | | |
| Larix
Tamarack or Larch | " | clustered on short spurs | | | | | | |
| Cedrus
Cedar | evergreen | clustered on spurs or alternate | | 4-sided or 4-grooved | | | | |
| Pinus
Pine | " | not clustered on spurs | fascicled in a membranous sheath | terete | | | | |
| Picea
Spruce | " | " | not fascicled, scattered | 4-sided, stiff, sessile | persistent, not decurrent | | | |
| Taxus
Yew | " | " | not fascicled, appearing 2-ranked by twist in stalk | flattened, stomata on upper side | decurrent | | | greenish not scaly |
| Tsuga
Hemlock | " | " | appearing 2-ranked, not soft | flattened, petiolate, stomata above | not decurrent | with prominent leaf cushions | yellowish or blackish | |
| Pseudotsuga
Douglas Fir | " | " | appearing 2-ranked, soft & flexible | " | " | smooth, with oval leaf scars | pointed, not resinous | |
| Abies
Fir | " | " | " | flattened, sessile, stomata above | " | " | obtuse, resinous | |
| Sciadopitys
Umbrella Pine | " | whorled at end of branches | | deeply grooved both sides | | | | |
| Chamaecyparis
Retinospora | " | opposite or whorled, in 4 rows | usually scale-like | with white markings on under side | | a little flat, compressed | | with 2-3 seeds under each cone scale |
| Thuja
Arborvitae | " | " | " | as above & glandular | | very flat, in one plane | not as above | |
| Cupressus
Cypress | " | " | usually scale-like and minutely toothed | with white markings on under side | | round or square, more or less in one plane, fan-like | with 4 or more seeds to each cone scale | |
| Juniperus
Juniper | " | " | awl-like or scalelike | with white markings on upper surface | | round or square, not in one plane, not fanlike | a berry | |

The Genus *ABIES* is distinguished thus

Leaves scattered, sessile, linear, flat and grooved or quadrangular, and appearing 2-ranked; leaf base not persistent; winter buds obtuse and resinous.

| species | leaves | color | branchlets | buds | cone bracts | bark | resin ducts |
|--------------|-------------------|-----------------------|--------------------------------------|----------------------|------------------------|--------|-------------|
| homolepis | pointed and rigid | lustrous, green | grayish, glabrous, deeply grooved | | | scaly | internal |
| veitchii | " | " | not grooved, densely brown pubescent | | | smooth | marginal |
| concolor | blunt | glaucous or pale blue | pubescent, yellow-green | resinous | | | |
| fraseri | " | lustrous, green | red, densely pubescent | small, very resinous | exserted | | |
| balsamea | " | " | ashy-gray, pubescent | " | not exserted, reflexed | | |
| cilicica | " | " | " | small, not resinous | hidden | | |
| nordmanniana | " | " | " | " | exserted and reflexed | | |

N.B. - All *ABIES* on this list are without bands of stomata on the upper side of the leaves, and have sub-globose winter buds with imbricate scales.

ABIES

The Genus *CEDRUS* may be recognized thus

Leaves alternate or clustered on short spurs; in fascicles of 2-5 surounded at the base by a sheath of scarious scales; needle-leaves angled or quadrangular in section.

| species | leading shoot and branchlets | cones | branchlets |
|-----------|------------------------------|--------------------------|--------------------------------|
| deodara | pendulous | rounded at apex | pubescent, densely so |
| atlantica | upright or nodding | apex truncate or concave | densely short-pubescent |
| libani | " | " | glabrous or scarcely pubescent |

The Genus *CHAMAECYPARIS* is recognized thus

Leaves opposite or whorled, usually scale-like and minutely denticulate; cones maturing the second year, with four or more seeds to each bract; branchlets a little flattened or angular (nearly square); internodes about square, glandular.

| species | branchlets | under side of leaves | glands | relative size of leaves | leaf tip | staminate flowers | foliage color |
|--------------|---------------------|------------------------------|-------------------------------|--------------------------|----------|-------------------|---------------------------------------|
| nootkatensis | nearly quadrangular | without white markings | usually lacking | lateral and facial equal | | | |
| pisifera | flattened | with white markings | obscure | " | | | |
| thyoides | " | " | conspicuous on back of leaves | " | | | |
| obtusa | " | " | not glandular | lateral ones larger | obtuse | yellow | lustrous dark green |
| lawsoniana | " | " (but sometimes indistinct) | conspicuous on back of leaves | " | acutish | red | bright green or more or less glaucous |

CRYPTOMERIA JAPONICA is recognized thus

a pyramidal tree with spreading and upcurving branches; bark red-brown, peeling in long strips much like a Cedar or a Cypress; buds minute; leaves linear-awl-shaped, flattened laterally, keeled both faces, bright green, decurrent, directed forward and curved in, in 5 ranks; flowers monocious, staminate cones in terminal racemes, pistillate cones solitary and globose at the ends of short lateral branchlets, brown, ripening the first year, persistent; cone-scales wedge-shaped.

The Genus CUPRESSUS is recognized thus

foliage fragrant; bark shredding; branchlets quadrangular or terete; leaves opposite, small, scale-like, appressed; cones globular, each cone-scale with numerous seeds.

| species | branches | lower bark | leaves |
|--------------|---------------------|--|---|
| sempervirens | erect or horizontal | thin, gray, smooth or slightly longitudinally fissured | ovate, glandular |
| macrocarpa | horizontal | ridged, dark reddish-brown, separating into thick, persistent scales | rhombic-ovate, not or obscurely glandular, swollen toward tip |

CRYPTOMERIA -- CUPRESSUS

The Genus JUNIPERUS is recognized thus

leaves opposite or whorled, alternating in pairs at right angles, linear or scale-like, often both kinds on the same plant, acute, with 2 glaucous or whitish lines on the upper side and green beneath; fruit berry-like.

| species | leaves | glands | upper side of leaves | leaf base | staminate flowers | branch-lets | leaf tip | fruit | form | habit | color |
|--------------|--------------------------------|---------|----------------------|-----------|-------------------|-------------|---------------------------|--|----------------------------|---|------------|
| communis | always needle-shaped & in 3's | absent | with one white line | jointed | axillary | | | dark blue | | | |
| macrocarpa | " | " | with two white lines | " | " | | | dark brown, glaucous 1-seeded, red-brown | | | |
| squamata | " | " | " | decurrent | terminal | green | | | | | |
| chinensis | of 2 kinds, opposite or in 3's | present | " | " | " | | scale-like, leaves obtuse | 2-3 seeded brown, bloomy | | | |
| excelsa | " margin entire | " | " | " | " | | acute | brown, 3-6 seeded | | | |
| virginiana | " | " | " | " | " | | acute or acuminate | blue, bloomy, erect | upright, or spreading tree | | |
| horizontalis | " | " | " | " | " | green | " | blue, bloomy, pendulous | shrub | prostrate | blue-green |
| sabina | " | " | " | " | " | | obtusish | " | " | ascending or spreading, odor bad when bruised | dark green |

JUNIPERUS

The Genus LARIX is recognized thus

tree with one main trunk through to the top, bark scaly; needle-leaves soft, deciduous, clustered on short spurs; fruit an ellipsoid cone with thinish scales.

WINTER : branches often drooping; branchlets with short lateral spurs on which are found the leaf scars; leaf scars alternate, raised, $\frac{1}{2}$ -round or triangular, minute, clustered on the short lateral spurs, with one bundle trace and no stipule scars; buds solitary, sessile, small, globose or short-ovoid, with many brown scales which are sometimes slender-pointed.

Summer and Winter Keys combined

| species | bracts | under side of leaves | cones | cone scales | branchlets |
|--------------------------|--------------------------|---------------------------------|---------|---|------------|
| occidentalis | exceeding scales of cone | | | | |
| leptolepis | shorter than scales | with two white bands | | | |
| europaea | " | without conspicuous white bands | erect | not incurved at apex, pubescent on back | glabrous |
| laricina | " | " | pendant | glabrous, striate, lustrous | " |
| dahurica
syn. Gmelini | " | " | | " | pubescent |

The Genus LIBOCEDRUS is recognized thus

Aromatic trees with the branchlets densely clothed with small, appressed, scale-like leaves; leaves 4-angled or terete, rarely flattened, opposite, minutely denticulate and ciliate, possibly awl-shaped and spreading on very young plants; cones globose or nearly so, ripening the 2nd season, with up to 12 woody, shield-shaped scales, each scale with numerous flattish, narrowly winged seeds.

LARIX -- LIBOCEDRUS

The Genus *PICEA* is recognized thus
 leaves scattered, needle-shaped, four-sided, and stomatiferous on all four sides; branchlets with prominent leaf cushions separated by incised grooves and produced at the apex into a peg-like stalk (pulvinus) to which the leaf is attached.

| species | leaf form | stomata | branchlets | terminal winter-buds | cones | leaf position | leaves | bud scales |
|--|--------------|-------------------------|---|---------------------------------------|---|----------------------------------|---|--|
| <i>jezoensis</i> | flattened | white bands above only | glabrous shining | with awl-shaped scales at the base | scale margins minutely jagged | --- | not pungent | --- |
| <i>omorika</i> | " | " | pubescent | --- | with awl-shaped finely denticulate base | --- | with a distinct green midrib | --- |
| <i>mariana</i> | quadrangular | lines on all four sides | pubescent, glandular | " | scales flexible, margins jagged | --- | --- | --- |
| <i>orientalis</i> | " | " | pubescent | without awl-shaped scales at the base | scales stiff | --- | lustrous dark green, very short, obtuse odor strong | --- |
| <i>engelmanni</i> | " | " | " | not resinous | scales flexible rhombic | --- | glaucous, blue-green, 4-1" odor strong | --- |
| <i>excelsa</i>
syn. -
<i>abies</i> | " | " | almost glabrous, pubescence minute or scattered | not resinous | very long 2 1/2-7" | pointing forward | lustrous deep green | --- |
| <i>canadensis</i>
syn. <i>glauca</i> | " | " | glabrous | resinous | short (2" or less) easily crushed | " | glaucous, flexible, soft; incurved; strong-smelling | rounded, emarginate, tip scales revolute |
| <i>polita</i> | " | " | " | not resinous, dark brown | --- | spreading at nearly right angles | lustrous dark green, apex very sharp pulvini very large | firmly appressed, dark brown |
| <i>pungens</i> | " | " | " | not resinous, light yellow-brown | --- | " | pointed, blue-green | revolute at apex, light brown |

The Genus PINUS is recognized thus
 needle-leaves in clusters surrounded at the base by sheaths of bud scales.

| species | leaves in a cluster | sheaths | needles | branchlets | winter buds | cones | cone scales | twigs | upper bark | size of sheaths |
|---------------------------------|---------------------|------------|---|--|---------------------------------|---|----------------------------------|----------------------|------------------------------|-----------------|
| <i>flexilis</i> | five | deciduous | slender, margin entire | puberulous | | dehiscent, wingless seeds | | | | |
| <i>cembra</i> | " | " | margin serrulate | densely brown tomentose | | seeds winged | | | | |
| <i>excelsa</i> syn. | " | " | slender, 6-8" serrulate, pendulous | glabrous | | " | | glaucous | | |
| <i>peuce</i> | " | " | thick, soft, 2-5" serrulate | puberulous at 1st, soon glabrous | | " | | not glaucous | | |
| <i>strobis</i> | " | " | 2-5" rigid, serrulate | " | | " | | | | |
| <i>bungeana</i> | 1-4, usually 3 | " | long, stiff, straight, blue-green | bloomy | blue-green, not resinous | deciduous | | | chalky-white | |
| <i>jeffreyi</i> | usually three | persistent | long, 5-11" stout, bright green, back rounded | orange-brown, not bloomy, fragrant when broken | resinous, scales appressed | deciduous, pricklysub-terminal | | | orange, with odor of vanilla | |
| <i>ponderosa</i> | " | " | long, 3-7" stout, dark green, back flat | light brown not bloomy | scale tips spreading | tenaciously persistent, symmetrical, not prickly | | | | |
| <i>virginiana</i> | two | " | | glaucous | very resinous, scales appressed | symmetrical, prickly | | | | |
| <i>banksiana</i> | " | " | stout, twisted | not glaucous | resinous | tenaciously persistent, asymmetrical, not prickly | | orange | | |
| <i>sylvestris</i> | " | " | stout, twisted | " | " | deciduous, short stalked | umbo small, obtuse | dull greenish yellow | bright orange, peeling | |
| <i>montana</i> syn. <i>mugo</i> | " | " | " | " | " | deciduous, sub-sessile | prickly, light gray marked black | " | dark brownish | |
| <i>resinosa</i> | " | " | not twisted, lustrous | " | " | deciduous | | orange | reddish | 4/5" |
| <i>nigra</i> | " | " | not twisted, dull | " | " | " | | yellow-green | reddish | 3/4" |

The Genus *PSEUDOTSUGA* is recognized thus
buds not resinous, pointed; needle-leaves soft and flexible, linear, flattened, spirally arranged but spreading in two opposite rows; branches marked by oval scars where leaves have fallen; fruit a cone.

The Genus *TAXODIUM* is recognized thus
bark furrowed and scaly; branchlets of two kinds, persistent and with axillary buds or deciduous and without axillary buds; leaves alternate, flat, short, 2-ranked on the deciduous branchlets; fruit a globose, short-stalked cone.

The Genus *TAXUS* is recognized thus
leaves linear, often curved and scythe-shaped, petiolate, spreading in 2 ranks, very dark green with two broad yellowish bands on the under side; branches irregularly alternate; fruit a bony nutlet surrounded or almost enclosed by a cup-shaped, fleshy, scarlet disk.

| species | bud scales | leaves | midrib | color | foliage |
|------------|-----------------------|------------------------|-----------------|---------------------------------|------------------------|
| baccata | obtuse,
not keeled | gradually
acuminate | | | |
| cuspidata | acute,
keeled | abruptly
pointed | pointed above | very dark
green | broad |
| canadensis | " | " | slightly raised | lighter green,
turning brown | less broad,
slender |

The Genus *SEQUIA* is recognized thus
a tall, evergreen tree, often exceptionally large and of very great age; bark thick, red-brown, fibrous, deeply furrowed and ridged; leaves alternate, persistent, solitary, scattered, linear to lanceolate, with 2 white stomatic lines on the under side, petiolate; also with scale-like leaves spirally arranged; branchlets all persistent; fruit a cone, woody, persistent, with divergent scales spirally arranged, widened at the top and with a depressed center, wrinkled, without distinct bracts, with 6-9 flattened seeds; winter buds scaly.

PSEUDOTSUGA -- *TAXODIUM* -- *TAXUS* -- *SEQUIA*

The Genus THUJA is recognized thus

branchlets disposed in one plane, flattened; leaves scalelike, in pairs alternate at right angles, the lateral leaves nearly covering the facial ones; fruit a cone, ovoid-oblong or ovoid.

| species | branchlets | cone scales | seeds | leaves | glands | leaf apex |
|--------------|---------------------|--------------------------------|----------|--|---------|-----------|
| orientalis | in vertical planes | thick | wingless | | | |
| occidentalis | planes not vertical | thin | winged | yellow-green beneath and with a gland with triangular white markings | | |
| koraiensis | " | " | " | | present | |
| plicata | " | thin, fertile scales usually 6 | " | " | absent | acute |
| standishi | " | thin, fertile scales usually 4 | " | " | " | obtuse |

The Genus TSUGA is recognized thus

branchlets with prominent leaf cushions; buds globose or ovoid, not resinous; leaves spirally arranged but appearing 2-ranked by reason of a twist in the petiole, linear, flattened and grooved above, and with 2 whitish bands of stomata on the under side; fruit a small cone of concave woody scales.

| species | leaves | branchlets |
|-------------|----------------------------------|------------|
| caroliniana | margin entire | pubescent |
| canadensis | margin denticulate near the apex | " |

THUJA -- TSUGA

GLOSSARY

- achene - a small, dry, hard, -1-celled, 1-seeded, fruit, indehiscent
- acorn - a 1-celled, 1-seeded nut, fixed in a woody cup or involucre
- acuminate - tapering at the end
- acute - terminating in a sharp or well-defined angle
- adventitious - imperfectly naturalized, as roots growing from internodes as well as nodes
- aggregate - a collection or collected mass
- alternate - (of leaves, etc.) arranged singly, at different points, not opposite
- ament - a catkin or scaly spike
- anastomosing - the ends of the veins curved to connect with the vein ahead, and by cross-veins forming a network
- annual - of one year's growth or duration
- anther - the tip of the stamen containing pollen
- apetalous - having no petals
- apiculate - ending in a short, pointed tip
- appressed - lying close and flat against
- armed - with spines or prickles
- articular - with a joint
- articulate - having a joint or node; jointed
- ascending - rising somewhat obliquely or curving upward
- astringent - having the power to contract or draw together organic tissues
- attenuate - slenderly tapering; becoming very narrow
- auricle - an ear-shaped appendage
- auriculate - ear-shaped
- awl-shaped - tapering upward from the base to a slender or rigid point
- awn - a bristle-shaped appendage
- axil - the angle formed by a leaf or branch with the stem
- axillary - situated in an axil
- bast - the fibrous portion of the inner bark
- beaked - ending in a prolonged tip
- bearded - bearing a long awn, or furnished with long or stiff hairs
- berry - a fruit with the seeds embedded in a fleshy pulp which represents the entire pericarp except the outer layer or skin, as the tomato, grape, and currant.
- bi or bis- - a Latin prefix signifying two, twice, or doubly
- biennial - of two years duration
- bilabiate - two-lipped
- bipinnate - doubly or twice pinnate

bivalvular - with two valves
 blade - the expanded portion of a leaf, etc.
 bract - a more or less modified leaf subtending a flower or belonging to an inflorescence, or sometimes belonging to the stem
 bractlet - a secondary bract, as one upon the pedicel of a flower
 bristles - coarse, stiff hairs
 bristly - having or resembling bristles
 bud - the rudimentary state of a stem or branch; an unexpanded flower
 budding - the act of setting a bud of one tree in contact with the cambium of another for purposes of propagation
 bulb - an underground leaf bud with fleshy scales or coats
 bulbous - having the character of a bulb
 bundle-trace - the tiny marks upon leaf scars representing the ends of the vascular bundles which penetrated the leaf and carried water and minerals to the leaf cells.
 caducous - falling off early
 calcareous - composed of, containing, or of the nature of lime or limestone
 callus - a hard protuberance or callosity
 calyx - the outer perianth of the flower
 campanulate - bell-shaped; cup-shaped with a broad base
 canescent - hoary with gray pubescence
 capsular - belonging to or of the nature of a capsule
 capsule - a dry, dehiscent fruit composed of more than one carpel
 carpel - a simple pistil or one member of a compound pistil
 catkin - an ament or a deciduous scaly spike of asexual, apetalous flowers
 chaff - a small, thin scale or bract, becoming dry and membranous
 chambered - (of the pith) having hollows or cavities
 ciliate - marginally fringed with hairs
 coalescence - the union of parts or organs of the same kind
 collateral - subordinately connected; secondary
 compound - composed of two or more similar parts united into one whole.
 compound leaf - one divided into separate leaflets
 compressed - flattened, especially laterally
 conduplicate - folded together lengthwise
 cone - a dry, multiple fruit composed of a dense aggregation of scales arranged symmetrically around an elongated axis, and bearing seeds on the upper side
 confluent - running into each other; blended into one
 coniferous - cone-bearing
 conglomerate - a mass or collection of material

conical - shaped like a cone
 connate - united; used especially of like structures joined from the start
 connivent - coming into contact; converging
 convolute - rolled up longitudinally
 cordate - heart-shaped with the point upward
 coriaceous - leathery in texture
 corm - enlarged fleshy base of a stem, bulb-like but solid
 corolla - the inner perianth; composed of petals
 corrugated - wrinkled or in folds
 corymb - a flat-topped or convex open flower cluster; in the stricter use of the word equivalent to a contracted raceme and progressing in its flowering from the margin inward
 corymbose - in corymbs or corymb-like
 crenate - dentate with the teeth much rounded
 crenulate - finely crenate
 cucullate - hooded or hood-shaped; cowled
 cuneate - wedge-shaped; triangular with the acute angle downward
 cuspidate - tipped with a sharp and rigid point
 cyme - a broad and flattish determinate inflorescence, i.e. with its central or terminal flowers blooming earliest
 cymose - bearing cymes or cyme-like
 deciduous - not persistent; not evergreen
 decurrent (leaf) - extending down the stem below the insertion
 dehiscent - opening regularly by valves or slits, etc. as a capsule or anther
 deltoid - triangular; like an equilateral triangle
 dentate - toothed, usually with the teeth directed outward
 denticulate - minutely dentate
 depressed somewhat flattened from above
 di-, dis- - a Greek prefix signifying two or twice
 diadelphous (stamens) - combined in two sets
 diaphragms - dividing membranes or partitions
 diffuse - widely or loosely spreading
 dioecious - of two households; unisexual, with two kinds of flowers on separate plants
 disc (disk) - a development of the receptacle at or around the base of the pistil
 dissected cut or divided into numerous segments

distinctious - in two vertical ranks
distinct - separate; not united; evident
divaricate - widely divergent
divided - lobed to the base
dorsal - on or related to the back or outer surface of an organ
drupe - a fleshy or pulpy fruit with the inner portion of the pericarp hard or stony, one-celled and one-seeded, viz. plum
drupelet - a diminutive drupe
e- or ex- - a Latin prefix meaning without
ecology - concerning the relation of plants to their surroundings
ellipsoid - oblong with rounded ends
elliptic - of or pertaining to or shaped like an ellipse
emarginate - having a shallow notch at the extremity
endogenous - growing throughout the substance of a stem instead of by superficial layers
entire - without toothing or division
erose - as if gnawed
exfoliating - cleaving off in thin layers
exotic - foreign; not native; appearing as if belonging to another part of the world
exserted - projecting beyond an envelope, as stamens from a corolla
falcate - scythe-shaped; curved and flat, tapering gradually
fascicle - a close bundle or cluster
fastigate (branches) - erect and near together; columnar
fibrous - composed of or resembling fibers
filament - the part of the stamen which supports the anther
filiform - thread-shaped
fimbriate - fringed
fissured - cracked or split
flaking - breaking off in small, flat fragments or scales
flaky - easily separable into flakes
flexible - capable of being bent
flexuous - zigzag, bending alternately in opposite directions
foliaceous - leaflike in texture or appearance
foliate - having leaves
foliolate - having leaflets
forked - divided into nearly equal branches

fluted - showing parallel grooves

fruit - the seed-bearing product of a plant

fusiform - spindle-shaped; swollen in the middle and narrowing toward each end

gibbous - protuberant or swollen on one side

glabrate - somewhat glabrous or becoming glabrous

glabrescent - inclined to be glabrous

glabrous - smooth; not rough, pubescent, or hairy

gland - a secreting surface or structure; any protuberance or appendage having the appearance of such an organ

glandular - bearing glands or of the nature of a gland

glaucous - covered or whitened with a bloom (wild yeast)

glazed - smooth and shining; glassy

globose - globe-like; nearly globular

glutinous - sticky

gnarled - distorted, knotty; twisted and cross-grained

grafting - the process of propagation by inserting a scion into a tree

habit - the general appearance of a plant

hastate - like an arrow-head

head - a dense cluster of sessile or nearly sessile flowers on a very short axis or receptacle

hispid - beset with rigid or bristly hairs or with bristles

hoary - grayish-white with a fine, close pubescence

hybrid - a cross-breed of two species

humus - decayed vegetable matter in the soil

husk - the outer covering of fruits or seeds

imbricate - overlapping, either vertically or spirally

impressed - bent inward; hollowed or furrowed as if by pressure

incised - cut sharply and irregularly, more or less deeply

indefinite - inconstant in number or very numerous

indehiscent - not opening by valves, etc; remaining persistently closed

inflated - bladdery; puffed out

inflorescence - the flowering part of a plant, and especially the mode of its arrangement

inserted - attached to or growing out of

inter- or intra- - between

internode - the portion of a stem between two nodes or growing points

introduced - brought intentionally from another region, as for purposes of cultivation
 involucre - a circle or collection of bracts surrounding a flower cluster or head, or a single flower
 irregular - showing inequality in size, form, or union
 keel - a central dorsal ridge, like the keel of a boat
 keeled - having a keel or ridge
 labiate - lipped
 lacinate - slashed; cut into narrow, pointed lobes
 lanceolate - shaped like a lance-head; several times longer than wide, broadest above the base and narrowed to the apex
 lateral - pertaining to, directed from, or directed toward the side
 leaflet - a single division of a compound leaf
 legume - the fruit of the Leguminosae, formed of a single pistil and usually splitting open by both sutures; bean-like
 leguminous - pertaining to a legume or to the Leguminosae
 lenticel - breathing pore of leaf or stem
 lenticular - lentil-shaped; of the shape of a double convex lens; having lenticels
 limb - the expanded portion of any leaf or petal; a branch of a tree growing out from the trunk
 linear - long and narrow, with parallel margins
 lobe - any segment of an organ, especially if rounded
 lobed - divided into or bearing lobes
 median - pertaining to the middle
 membrane - a thin, sheetlike structure connecting other structures or serving to cover or line some part or organ
 membranous - thin, rather soft and more or less translucent tissue; pertaining to a membrane
 -merous - in composition, having parts, as 2-merous, having two parts of each kind
 midrib - the central or main vein of a leaf
 monodelphous (stamens) - united by their filaments into a tube or column
 monoecious - with stamens and pistils in separate flowers on the same plant; of one household
 mucilaginous - adhesive or slimy with vegetable gum
 mucronate - tipped with a short and small abrupt tip; spiny-tipped (veins)
 mucronulate - with a minute spiny tip; inclined to be mucronate
 multiple - containing or consisting of more than one
 nerve - a simple or unbranched vein or slender rib
 netted (veination) - meshed like a net
 node - growing points along the stem; the place along the stem which normally bears a leaf or leaves
 nut - a hard indehiscent 1-celled and 1-seeded fruit, though usually resulting from a compound ovary

nutlet - a diminutive nut

ob- - a Latin prefix, usually carrying the idea of inversion

obcordate - inverted heart-shaped

oblanceolate - lanceolate with the broadest part near the apex

oblique - unequal sided, lop-sided, or slanting

oblong - longer than broad and with nearly parallel sides

obovate - inverted ovate

obovoid - having the form of an inverted egg

obtuse - blunt or rounded at the end

opaque - dull, neither shining nor translucent; impervious to light

opposite - arranged in pairs

orbicular - circular

ovate - egg-shaped, broadest near the base

ovoid - with an oval outline

palmate - radially lobed or divided

panicle - a loose, irregularly compound inflorescence with pedicelled flowers

panicled, paniculate - borne in a panicle; resembling a panicle

papilionaceous - (corolla) having a standard, wings, and a keel, as in a
pea- or bean-blossom

papillose - bearing minute, nipple-shaped projections

pappus - the modified calyx limb in Compositae, forming a crown of very various
character at the summit of the achene

parted - cleft nearly but not quite to the base

pedicel - the support of a single flower

peduncle - a primary flower-stalk, supporting either a cluster or a solitary
flower

pedunculate - borne upon a peduncle

pellucid - clear, transparent

peltate - shield-shaped and attached to the support by the lower surface

pendulous - more or less hanging or declined

perennial - lasting year after year

perfect - (flower) having both pistil and stamens

perianth - the floral envelope, consisting of calyx and corolla

persistent - long continuous, as a calyx upon the fruit, leaves through the
winter, etc.

petal - a division of the corolla

petaloid - colored like and resembling a petal

petiolate - having a petiole

petiole - the stem of a leaf

pilose - hairy, especially with soft hairs

pinnate (leaf) - compound with the leaflets arranged on each side of a
common petiole

pinnatifid - pinnately cleft

pistil - the seed-bearing organ of a flower, consisting of the ovary, stigma
and style when present

pistillate - provided with pistils, and in its more proper sense without stamens

pitted - marked with small depressions or pits

plicate folded into plaits, usually lengthwise

plumose - having fine hairs on each side, like the barbs of a feather

pod - any dry and dehiscent fruit

pollen - the fecundating grains contained in the anther

polliniferous - bearing pollen

pome - a fleshy fruit with the seeds contained in a stiff-walled cells like
the apple

porous - pierced with many small holes or pores

prickle - a small spine, or more or less slender, sharp outgrowth from the
bark or rind

procumbent - lying on the ground or trailing but without rooting at the nodes

prostrate - lying flat on the ground

puberulent - minutely pubescent; inclined to be pubescent

pubescent - covered with hairs, especially if short, soft, and downlike

pulvinus (1) - an enlargement or protuberance at the base or insertion of a leaf

punctate - dotted with depressions, or with translucent internal glands or
colored dots

pungent - having power to affect the nerves of sensation, as by pricking,
stinging or piercing; acrid

pyriform - pear-shaped

raceme - a simple inflorescence of pedicelled flowers upon a common more or less
elongated axis

racemose - in racemes or resembling racemes

rachis - the axis of a spike or of a compound leaf

radiate - spreading from or arranged around a common center

receptacle - the expanded portion of an axis bearing the organs, as pistil and
stamens

recurved - curved downward or backward

reflexed - abruptly bent or turned downward

regular - uniform in shape or structure

reniform - kidney-shaped

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reflexed - abruptly bent or turned downward

regular - uniform in shape or structure

reniform - kidney-shaped

repand - with a slightly uneven and somewhat sinuate margin

resinous - with resin

reticulate - net-veined

retuse - with a shallow notch at a rounded apex

revolute - rolled backward from the margins or apex

rhachis - see rachis

rib - a primary or prominent vein of a leaf

rotate - wheel-shaped

rufous - see rufus

rufus - reddish-brown

rugged - having a surface full of abrupt inequalities; rough; uneven

rugose - wrinkled

salver-shaped - (corolla) having a slender tube abruptly expanded into a flat limb

samara - an indehiscent winged fruit

scabrous - rough to the touch

scarious - thin, dry, and membranaceous, not green

scurfy - with exfoliated skin thrown off in minute scales

segment - one of the parts of leaf or other like organ that is cleft or divided

sepal - a division of the calyx

serrate - having sharp teeth pointing forward

serrulate - finely serrate

sessile - without footstalk of any kind

setose - beset with bristles

sheath - a tubular envelope

silky - covered with close-pressed, soft, and straight pubescence

simple - of one piece, not compound

sinuous - curving in and out

sinuate - with the outline of the margin strongly wavy

sinus - the cleft or recess between two lobes

smooth - without roughness or pubescence

spike - a form of simple inflorescence with the flowers sessile or nearly so upon a more or less elongated common axis

spine - a sharp woody or rigid outgrowth from the stem

spinescent - spine-like or having spines

resinous - with resin

reticulate - net-veined

retuse - with a shallow notch at a rounded apex

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spinescent - spine-like or having spines

translucent - allowing some passage of light so that objects may be partly
evident but not clearly visible

trifoliate - with three leaflets

truncate - ending abruptly as if cut off transversely

tuber - a thickened and short underground branch having numerous buds or eyes

tubercle - a small tuber or tuber-like body, usually subterranean

turbinate - top-shaped

umbel - an inflorescence in which the peduncles or pedicels of a cluster
spring from the same point

umbellate - in or like an umbel

undulate - with a wavy surface

uni- - in composition, one

unisexual - of one sex, either staminate or pistillate only

urceolate - urn-shaped

valvate - opening by valves, as a capsule; or meeting by the edges without
overlapping

valve - one of the pieces into which a capsule splits

valvular - having valves

velutinous - velvety

ventral - on or relating to the front or inner surface of an organ

verruucose - covered with wart-like projections

villous - bearing long and soft hairs

viscid - glutinous, sticky

whorl - an arrangement of leaves in a circle around the stem

whorled - with three or more leaves, buds, scars, or twigs in a circle
around the stem

wing - any membranous or thin expansion bordering or surrounding an organ;
the lateral petal of a papilionaceous corolla

woolly - clothed with long and tortuous or matted hairs

NOMENCLATURE

Deciduous Trees

Acanthopanax ricinifolium (Seem.) - Castor Aralia. syn. *Kalopanax pictus*
Acer campestre (Linn.) - Hedge or Field Maple
Acer dasycarpum (Ehrh.) - Silver or Soft Maple. syn. *Acer saccharinum*
Acer japonicum (Thunb.) - Japanese or Full-Moon Maple
Acer negundo (Linn.) - Box Elder
Acer nigrum (Michx.) - Black Maple
Acer palmatum (Thunb.) - Japanese Maple, Palmate-leaved Maple
Acer pennsylvanicum (Linn.) - Moosewood, Striped or Goosefoot Maple
Acer platanoides (Linn.) - Norway Maple
Acer pseudoplatanus (Linn.) - Sycamore Maple
Acer rubrum (Linn.) Red Maple, Scarlet Maple
Acer saccharinum (Linn.) - Silver Maple . syn. *Acer dasycarpum*
Acer saccharum (Marsh.) - Sugar Maple, Hard Maple
Acer spicatum (Lam.) - Mountain Maple
Aesculus glabra (Willd.) - Ohio Buckeye
Aesculus hippocastanum (Linn.) - Horsechestnut
Ailanthus altissima (Mill.) -Stinking Chun, Tree of Heaven. syn. *A.glandulosa*
Ailanthus glandulosa (Desf.) - Tree of Heaven, Ash-can Tree. syn. *A.altissima*
Alnus glutinosa (Gaertn.) - Black or European Alder
Alnus incana (Willd.) - Speckled or Hoary-leaved Alder
Amelanchier canadensis (Med.) - Juneberry, Downy Shadblow
Amelanchier laevis (Wieg.) - Shadblow, Allegheny Serviceberry
Asimina triloba (Dunal.) Papaw
Betula alba (Linn.) - White Birch. syn. *Betula pendula*
Betula lenta (Linn.) - Cherry Birch, Sweet Birch
Betula lutea (Michx.) - Yellow Birch
Betula nigra (Linn.) - Red or River Birch
Betula papyrifera (Marsh.) - Paper or Canoe Birch
Betula pendula (Roth.) - White Birch. syn. *B.alba*
Betula populifolia (Ait.) - Gray Birch, Poplar Birch
Carya cordiformis (Wangh.) - Bitternut Hickory. syn. *Hicoria cordiformis*
Carya glabra (Mill.) - Pignut Hickory. syn. *Hicoria glabra*
Carya laciniata (Michx.) - Kingnut or Big Shellbark Hickory. syn. *Hicoria laciniata*
Carya ovata (Mill.) - Shagbark Hickory. syn. *Hicoria ovata*
Carya pecan (Marsh.) - Pecan. syn. *Hicoria pecan*
Carya tomentosa (Lam.) - Mockernut or White Hickory. syn. *Hicoria alba*
Carpinus caroliniana (Walt.) - Blue Beech, Ironwood.
Castanea dentata (Borkh.) - Chestnut
Castanea mollissima (Blume.) - Chinese Chestnut
Catalpa bignonioides (Walt.) - Southern Catalpa
Catalpa kaempferi (Sieb. & Zucc.) - Japanese Catalpa. syn. *Catalpa ovata*
Catalpa speciosa (Engelm.) - Western Catalpa
Catalpa ovata (Don.) - Japanese Catalpa syn. *Catalpa Kaempferi*
Cedrela sinensis (Juss.) - Chinese Cedrela
Celtis occidentalis (Linn.) - Hackberry
Cercidiphyllum japonicum (Sieb. & Zucc.) - Katsura tree, Cercis-leaf
Cercis canadensis (Linn.) - Redbud or Judas tree
Gleditsia lutea (Koch.) - Yellow-wood, Virgilia
Cornus alternifolia (Linn.) - Alternate-leaved or Pagoda Dogwood
Cornus florida (Linn.) - Flowering Dogwood
Cornus mas (Linn.) - Cornelian Cherry
Crataegus coccinea (Linn.) - Red Haw, Scarlet Thorn. syn. *Crataegus intricata*
Crataegus cordata (Ait.) - Washington Thorn. syn. *Crataegus phaenopyrum*
Crataegus crus-galli (Linn.) - Cockspur Thorn
Crataegus monogyna (Jacq.) - English Hawthorn
Crataegus oxyacantha (Linn.) - English Hawthorn White Thorn, Quickset.
Crataegus phaenopyrum (L.f.) - Washington Thorn. syn. *Crataegus cordata*
Crataegus punctata (Jacq.) - Dotted Hawthorn
Diospyros virginiana (Linn.) - Persimmon
Elaeagnus angustifolia (Linn.) - Russian Olive, Oleaster
Fagus americana (Sweet.) - Beech, Silver Beech. syn. *Fagus grandifolia*
Fagus grandifolia (Ehrh.) - Silver Beech. syn. *Fagus americana*
Fagus sylvatica (Linn.) - European Beech

Fraxinus americana (Linn.) - White Ash
Fraxinus excelsior (Linn.) - European Ash
Fraxinus lanceolata (Borkh.) - Green Ash. syn. *Fraxinus pennsylvanica* Lanceolat
Fraxinus nigra (Marsh.) - Black Ash or Hoop Ash
Fraxinus pennsylvanica (Marsh.) - Red Ash
Fraxinus quadrangulata (Michx.) - Blue Ash
Ginkgo biloba (Linn.) - Ginkgo, Maidenhair Tree
Gleditsia triacanthos (Linn.) - Honey Locust
Gymnocladus dioica (Koch) - Kentucky Coffee Tree. syn. *G. dioicus* (Linn.)
Halesia tetraptera (Linn.) - Silverbell, Snowdrop tree. syn. *Halesia tetraptera*
Halesia tetraptera (Ellis.) - Silverbell, Snowdrop tree. syn. *H. carolina*
Hicoria alba (Brit.) - Mockernut or White Hickory. syn. *Carya tomentosa*
Hicoria cordiformis (Brit.) - Bitternut Hickory. syn. *Carya cordiformis*
Hicoria glabra (Brit.) - Pignut Hickory. syn. *Carya glabra*
Hicoria laciniata (Sarg.) - Kingnut or Big Shellbark Hickory. syn. *Carya laciniata*
Hicoria ovata (Brit.) - Shagbark Hickory. syn. *Carya ovata*
Hicoria pecan (Brit.) - Pecan. syn. *Carya pecan*
Juglans cinerea (Linn.) - Butternut, White Walnut
Juglans nigra (Linn.) - Black Walnut
Juglans regia (Linn.) - English or Persian Walnut
Juglans sieboldiana (Maxim.) - Japanese Walnut, Kurume
Koelreuteria paniculata (Laxm.) - Japanese Varnish Tree
Kalopanax pictus (Thunb.) - Castor Aralia. syn. *Acanthopanax ricinifolium*
Laburnum anagyroides (Med.) - Golden Rain tree. syn. *Laburnum vulgare*
Laburnum vulgare (Griseb.) - Golden Chain tree. syn. *Laburnum anagyroides*
Liquidambar styraciflua (Linn.) - Sweet Gum
Liriodendron tulipifera (Linn.) - Tulip tree, Whitewood
Maclura pomifera (Schneid.) - Osage Orange, Hedge Apple
Magnolia acuminata (Linn.) - Cucumber Tree
Magnolia glauca (Linn.) - Sweet Bay. syn. *Magnolia virginiana*
Magnolia soulangeana (Soul.) - Saucer Magnolia
Magnolia tripetala (Linn.) - Umbrella Magnolia
Magnolia virginiana (Linn.) - Sweet Bay. syn. *Magnolia glauca*
Malus angustifolia (Michx.) - Southern Crab
Malus arnoldiana (Sarg.) - Arnold Crab
Malus baccata (Borkh.) - Siberian Crab
Malus coronaria (Mill.) - Garland Crab
Malus floribunda (Sieb.) - Japanese Flowering Crab
Malus halliana (Koech.) - Hall's Crab
Malus ioensis (Brit.) - Prairie Crab
Malus sargentii (Rehd.) - Sargent Crab
Malus schiedeckeri (Zab.) - Schiedeckeri Crab
Malus spectabilis (Borkh.) - Chinese Flowering Crab
Morus alba (Linn.) - White Mulberry, Chinese Mulberry
Morus rubra (Linn.) - Red Mulberry
Nyssa sylvatica (Marsh.) - Tupelo, Pepperidge, Sour Gum
Ostrya virginiana (Koch.) - Hop Hornbeam, Ironwood
Paulownia imperialis (Seib. & Zucc.) - Royal Paulownia. syn. *Paulownia tomentosa*
Paulownia tomentosa (Thunb.) - Royal Paulownia. syn. *P. imperialis*
Phellodendron amurense (Rupr.) - Amoor Cork Tree
Phellodendron sachalinense (Sarg.) - Saghalin Cork Tree
Platanus acerifolia (Willd.) - London Plane Tree
Platanus occidentalis (Linn.) - Sycamore, Buttonwood
Platanus orientalis (Linn.) - Platan, European Plane Tree
Populus alba (Linn.) - White Poplar, Abele
Populus deltoides (Marsh.) - Carolina Poplar, Cottonwood
Populus grandidentata (Michx.) - Coarse-toothed Poplar
Populus nigra (Linn.) - Black Poplar
Populus simoni (Carr.) - Simon Poplar
Populus tremuloides (Michx.) - Quaking Aspen
Prunus avium (Linn.) - Sweet Cherry
Prunus cerasifera (Ehrh.) - Cherry Plum
Prunus cerasus (Linn.) - Dwarf or Pie Cherry
Prunus padus (Linn.) - Bird Cherry
Prunus pennsylvanica (Linn.) - Pin Cherry, Bird Cherry
Prunus persica (Sieb. & Zucc.) - Peach
Prunus serotina (Ehrh.) - Wild Black Cherry
Prunus subhirtella (Miq.) - Rosebud or Japanese Cherry
Prunus virginiana (Linn.) - Choke Cherry

Pyrus communis (Linn.) - Common Pear
Quercus alba (Linn.) - White Oak
Quercus bicolor (Willd.) - Swamp White Oak
Quercus coccinea (Muench.) - Scarlet Oak
Quercus imbricaria (Michx.) - Shingle Oak
Quercus macrocarpa (Michx.) - Bur Oak, Mossy-cup Oak
Quercus Marilandica (Muench.) - Black Jack or Jack Oak
Quercus palustris (Linn.) - Pin Oak
Quercus phellos (Linn.) - Willow Oak
Quercus prinus (Linn.) - Basket Oak. syn *Quercus michauxi*
Quercus robur (Linn.) - English Oak
Quercus rubra (DuRoi.) - Red Oak. syn. *Quercus borealis maxima*
Quercus velutina (Lam.) - Black Oak
Robinia pseudoacacia (Linn.) - Black Locust
Salix alba (Linn.) - White or Huntingdon Willow
Salix babylonica (Linn.) - Weeping Willow, Napoleon Willow
Salix caprea (Linn.) - Goat Willow
Salix vitellina (Linn.) - Golden Willow. syn. *Salix alba vitellina*
Sassafras albidum (Nutt.) - Sassafras. syn. *Sassafras variifolium*
Sassafras variifolium (Kuntze.) - Sassafras. syn. *Sassafras albidum*
Sophora japonica (Linn.) - Chinese Scholartree
Sorbus americana (Marsh.) - Mountain Ash
Sorbus aucuparia (Linn.) - European Mountain Ash, Roan tree
Syringa japonica (Decne.) - Japanese Tree Lilac. syn. *Syringa amurensis* (Rupr.)
Tilia americana (Linn.) - Basswood, Whitewood
Tilia cordata (Mill.) - Littleleaf Linden
Tilia europaea (Linn.) - Common Linden, Lime tree. syn. *Tilia vulgaris*
Tilia heterophylla (Vent.) - Beetree Linden
Tilia petiolaris (Hook. f. not D.C.) - Weeping White Linden
Tilia tomentosa (Moench.) - Silver Linden
Tilia vulgaris (Hayne.) - Common Linden, Lime tree. syn. *Tilia europaea*
Ulmus americana (Linn.) - American or White Elm
Ulmus campestris (Mill.) - English Elm. syn. *Ulmus procera*
Ulmus fulva (Michx.) - Red or Slippery Elm
Ulmus glabra (Huds.) - Scotch or Wych Elm
Ulmus procera (Salisb.) - English Elm. syn. *Ulmus campestris*
Ulmus pumila (Linn.) - Chinese or Siberian Elm
Ulmus thomasi (Sarg.) - Rock Elm. syn. *Ulmus racemosa*
Ulmus racemosa (Thomas, not Borkh.) - Rock Elm. syn. *Ulmus thomasi*
Zelkova serrata (Mak.) - Sawleaf Zelkova

DECIDUOUS SHRUBS

Acanthopanax pentaphyllum (March.) - Five-fingered Aralia. syn. *A. sieboldiana*
Acanthopanax sieboldianus (Mak.) - 5-fingered Aralia. syn. *A. pentaphyllum*
Acer ginnala (Maxim.) - Amur Maple
Acer tataricum (Linn.) - Tatarian Maple
Aesculus pavia (Linn.) - Damask Horsechestnut
Aesculus parviflora (Walt.) - Bottlebrush Buckeye
Alnus rugosa (Spreng.) - Smooth Alder, Hazel Alder
Alnus viridis (D.C.) - European Green Alder
Amelanchier alnifolia (Nutt.) - Saskatoon. Syn. *Amelanchier canadensis* var.
Amelanchier ovalis (Med.) European Shadblow. syn. *Amelanchier rotundifolia*
Amelanchier rotundifolia (Dum.-Cours.) - European Shadblow. syn. *A. ovalis*
Amorpha canescens (Nutt.) - Lead Plant
Amorpha fruticosa (Linn.) - False Indigo, Indigobush
Aralia spinosa (Linn.) - Hercules Club, Angelica Tree
Aronia arbutifolia (Spach.) - Red Chokeberry
Aronia melanocarpa (Spach.) - Black Chokeberry
Azalea amoena (Lindl.) - Amoena Azalea. syn. *Azalea obtusum*
Azalea arborescens (Pursh.) - Sweet or Smooth Azalea. syn. *Rhododendron arborescens*
Azalea mollis (molle) (Blume.) - Chinese Azalea
Azalea nudiflora (nudiflorum) (Linn.) - Pinxterbloom
Azalea obtusum (Lindl.) - Amoena Azalea. syn. *Azalea amoena*

Azalea obtusum (Lindl.) - Sweet or Smooth Azalea. syn. *Azalea amoena*
Azalea roseum (Rehd.) - Downy Pinxterbloom
Azalea vaseyi (Rehd.) - Pinkshell Azalea. syn. *Rhododendron vaseyi* (Gray)
Azalea viscosa (viscosum) (Linn.) - Swamp Azalea or Swamp Honeysuckle
Baccharis halimifolia (Linn.) - Groundsel Bush, Saltbush
Benzoin aestivale (Nees.) - Spicebush, Spicewood. syn. *Lindera benzoin*
Berberis buxifolia (Poir.) - Box Barberry
Berberis darwini (Hook.) - Darwin Barberry
Berberis thunbergii (D.C.) - Thunberg's or Japanese Barberry
Berberis wilsoni (Hemsl.) - Wilson Barberry
Berberis vulgaris (Linn.) - Common Barberry
Betula nana (Linn.) - Dwarf Birch
Betula pumila (Linn.) - Hairy Dwarf Birch
Buddleia davidi (Franch.) - Butterfly Bush. syn. *Buddleia variabilis*
Buddleia variabilis (Hemsl.) - Butterfly bush. syn. *Buddleia davidi*
Calycanthus floridus (Linn.) - Carolina Allspice, Strawberry Bush
Caragana arborescens (Lam.) Pea Shrub, Pea Tree
Castanea pumila (Mill.) - Chinquapin
Catalpa bungei (C.A.Mey.) - Manchurian Catalpa
Ceanothus americanus (Linn.) - New Jersey Tea, Redroot
Cephalanthus occidentalis (Linn.) - Buttonbush, Honeyballs
Chaenomeles lagenaria (Loisel.) - Japanese Quince. syn. *Cydonia japonica*
Chionanthus virginica (virginicus) (Linn.) - White Fringe, Fringe-tree
Clethra alnifolia (Linn.) - Sweet Pepperbush, Summersweet
Colutea arborescens (Linn.) - Bladder Senna
Comptonia asplenifolia (Gaertn.) - Sweet Fern. syn. *Comptonia peregrina*
Comptonia peregrina (Coult.) - Sweet Fern. syn. *Comptonia asplenifolia*, *Myrica*
Cornus alba (Linn.) - Red or Tartarian Dogwood
Cornus amomum (Mill.) - Silky Cornel, Kinnikinnick
Cornus baileyi (Coult. & Evans) - Bailey Dogwood
Cornus paniculata (L'Her) - Gray or Panicked Dogwood. syn. *Cornus racemosa*
Cornus racemosa (Lam.) - Gray Dogwood. syn. *Cornus paniculata*
Cornus sanguinea (Linn.) - Bloodtwig Dogwood
Cornus stolonifera (Michx.) - Red-twigged Dogwood, Red-osier Dogwood
Corylus americana (Walt.) - American Hazel-nut
Corylus avellana (Linn.) - Filbert, European Hazel
Corylus cornuta (March.) - Cuckold Hazel. syn. *Corylus rostrata*
Corylus rostrata (Ait.) - Beaked Hazel. syn. *Corylus cornuta*
Cotinus coggyria (Scop.) - Smoketree. syn. *Rhus cotinus*
Cotoneaster acutifolia (Turcz.) - Peking Cotoneaster
Cotoneaster adpressa (Bois.) - Creeping Cotoneaster
Cotoneaster divaricata (Rehd. & Wilson) - Spreading Cotoneaster
Cotoneaster horizontalis (Decne.) - Rock Cotoneaster, Quinceberry
Cotoneaster hupehensis (Rehd. & Wilson) - Hupeh Cotoneaster
Cotoneaster racemiflora (Koch.) - Coin-leaf Cotoneaster
Cydonia japonica (Pers.) - Japanese Quince. syn. *Chaenomeles lagenaria*
Cytisus scoparius (Link.) - Scotch Broom
Daphne mezereum (Linn.) - Mezereon or Flowering Spurge
Deutzia gracilis (Sieb. & Zucc.) Slender Deutzia
Deutzia lemoinei (Hort.) Lemoine Deutzia
Deutzia scabra (Thunb.) - Fuzzy Deutzia
Dirca palustris (Linn.) - Leatherwood, Wicopy
Elaeagnus argentea (Pursh.) - Silverberry, Wolf Willow. syn. *E. commutata*
Elaeagnus commutata (Bernh.) - Silverberry. syn. *Elaeagnus argentea*
Elaeagnus longipes (Gray) - Cherry Elaeagnus, Gumi. syn. *E. multiflora*
Elaeagnus multiflora (Thunb.) - Cherry Elaeagnus. syn. *E. longipes*
Elaeagnus umbellata (Thunb.) - Autumn Elaeagnus
Euonymus alata (alatus) (maxim.) - Winged Burning Bush
Euonymus americanus (Linn.) - Brook Euonymus
Euonymus atropurpureus (Jacq.) - Wahoo, Skewerwood. syn. *E. atropurpurea* (Jacq.)
Euonymus europaeus (Linn.) - Spindle Tree
Euonymus yedoensis (Koehne.) - Yeddo Euonymus
Exochorda grandiflora (Lindl.) - Pearlbush. syn. *Exochorda racemosa*
Exochorda racemosa (Lindl.) - Pearlbush. syn. *Exochorda grandiflora*
Forsythia intermedia (Zabel.) - Golden Bell
Forsythia suspensa (Vahl.) - Golden Bell
Forsythia viridissima (Lindl.) - Golden Bell

Genista tinctoria (Linn.) - Dyer's Greenwood, Woodwaxen
Hamamelis japonica (Sieb.&Zucc) - Japanese Witch-hazel
Hamamelis virginiana (Linn.) - Witch-hazel
Hibiscus syriacus (Linn.) - Althaea, Rose of Sharon
Hippophae rhamnoides (Linn.) - Sea Buckthorn
Hydrangea arborescens (Linn.) - Smooth Hydrangea
Hydrangea paniculata (Sieb.) - Panicle or Plumed Hydrangea
Hydrangea quercifolia (Bartram.) - Oak-leaved Hydrangea
Hypericum calycinum (Linn.) - Aaron's beard
Hypericum densiflorum (Pursh.) - Bushy St. John's Wort
Ilex verticillata (Linn.) - Northern Holly, Black Alder, Winterberry
Kerria japonica (Wm.Kerr) - Kerria, Globe-flower, Corchorus
Kolkwitzia amabilis (Graebn.) - Beautybush
Ligustrum amurense (Carr.) - Amur Privet
Ligustrum ibolium (Coe.) - Ibolium Privet
Ligustrum ibota (Sieb.) - Ibota Privet
Ligustrum ovalifolium (Hassk.) - California Privet
Ligustrum quihoui (Carr.) - Quihou Privet
Ligustrum vulgare (Linn.) - Common Privet, or Prim
Lindera benzoin (L.) Bl. - Spicebush. syn. *Benzoin aestivale*
Lonicera bella (Zabel.) - Belle Honeysuckle
Lonicera chrysantha (Turcz.) - Coralline Honeysuckle
Lonicera fragrantissima (Lindl.) - Fragrant or Winter Honeysuckle
Lonicera korolkowi (Stapf.) - Blue-leaf Honeysuckle
Lonicera maackii (Maxim.) - Amur Honeysuckle
Lonicera morrowi (Gray) - Morrow Honeysuckle
Lonicera standishi (Carr.) - Standish Honeysuckle
Lonicera tatarica (Linn.) - Tatarian Honeysuckle
Lonicera xylosteum (Linn.) - Fly Honeysuckle
Lycium chinense (Mill.) - Chinese Box Thorn or Matrimony Vine
Lycium halimifolium (Mill.) - Common Matrimony Vine
Magnolia stellata (Maxim.) - Star Magnolia
Myrica carolinensis (Mill.) - Northern Bayberry or Candleberry
syn. *Myrica pennsylvanicum*
Myrica gale (Linn.) - Sweet Gale or Bog Myrtle
Myrica pennsylvanica (Lois.) - Candleberry. syn *Myrica carolinensis*
Nemopanthus mucronatus (Trel.) - Mountain Holly
Philadelphus coronarius (Linn.) - Mock Orange, Sweet Syringa
Philadelphus falconeri (Sarg.) - Star Mock-orange
Philadelphus gordonianus (Lindl.) - Gordon Mock-orange
Philadelphus lemoinei (Lemoine) - Lemoine Mock-orange
Philadelphus zeyheri (Schrad.) - Zeyher Mockorange
Photinia villosa (DC.) - Chinese Christmas-berry or Photinia
Physocarpus opulifolius (Maxim.) - Ninebark

Prunus glandulosa (Thunb.) - Dwarf Flowering Almond.
Prunus tomentosa (Thunb.) - Nanking or Nankeen Cherry
Prunus triloba (Lindl.) - Flowering Almond, Flowering Plum
Ptelea trifoliata (Linn.) - Wafer Ash
Quercus prinoides (Willd.) - Chinquapin, Chincapin Oak
Rhamnus caroliniana (Walt.) - Carolina Buckthorn or Indian Cherry
Rhamnus cathartica (Linn.) - Buckthorn
Rhamnus frangula (Linn.) - Glossy Buckthorn
Rhamnus purshiana (DC.) - Cascara sagrada
Rhododendron arborescens (Pursh.) Sweet Azalea. syn. *Azalea obtusum*
Rhododendron vaseyi (Gray) - Pinkshell Azalea. syn. *Azalea vaseyi*
Rhodotypos kerrioides (Sieb.& Zucc.) - Jetbead, White Kerria. syn. *R. scandens*
Rhodotypos scandens (Thunb.) - Jetbead. syn. *Rhodotypos kerrioides*
Rhus aromatica (Ait.) - Fragrant Sumac. syn. *Rhus canadensis*
Rhus canadensis (Marsh.) - Fragrant Sumach. syn. *Rhus aromatica*
Rhus copallina (Linn.) - Shining or Mountain Sumac
Rhus cotinus (Linn.) - Smoketree or Wig Tree. syn. *Cotinus coggyria*
Rhus glabra (Linn.) - Smooth Sumac
Rhus javanica (Thunb.) - Java Sumac. syn. *Rhus chinensis* (Mill.)
Rhus typhina (Linn.) - Staghorn Sumach

Ribes alpinum (Linn.) - Alpine or Mountain Currant
Ribes aureum (Pursh.) - Golden Flowering Currant
Ribes odoratum (Wendl.) - Missouri or Buffalo Currant
Ribes sanguineum (Pursh.) - Red-flowered or Winter Currant
Robinia hispida (Linn.) - Rose Acacia, Bristly Locust
Robinia viscosa (Vent.) - Clammy Locust
Rosa carolina (Linn.) - Pasture Rose. syn. *Rosa humilis*
Rosa eglanteria (Linn.) - Sweet Briar, Eglantine. syn. *Rosa rubiginosa*
Rosa hugonis (Hemsl.) - Father Hugo's Rose
Rosa humilis (Marsh.) - Pasture Rose. syn. *Rosa carolina*
Rosa multiflora (Thunb.) - Japanese or Many-flowered Rose
Rosa nitida (Willd.) - Bristly or Glossy-leaved Rose
Rosa rubiginosa (Linn.) - Sweet Briar or Eglantine. syn. *Rosa eglanteria*
Rosa rugosa (Thunb.) - Rugose Rose
Rosa setigera (Michx.) - Prairie Rose
Rosa wichuraiana (Crep.) - Memorial Rose
Rosa zanthina (Lindl.) - Korean Rose or Double Hugonis
Rubus allegheniensis (Porter.) - American Blackberry
Rubus flagellaris (Willd.) - Dewberry. syn. *Rubus procumbens*
Rubus idaeus (Linn.) - European or Common Raspberry
Rubus occidentalis (Linn.) - Black Raspberry or Blackcap
Rubus odoratus (Linn.) - Flowering Raspberry
Rubus procumbens (Muhl.) - Cultivated American Dewberry. syn. *Rubus flagellaris*
Rubus strigosus (Michx.) - Common Red Raspberry. syn. *Rubus idaeus strigosus*
Salix candida (Flugge.) - Rosemary Willow. syn. *Salix incana*
Salix discolor (Muhl.) - Pussy Willow
Salix humilis (Marsh.) - Prairie Willow
Salix incana (Schrank.) - Rosemary Willow. syn. *Salix candida*
Salix irrorata (Anders.) - Colorado Willow
Salix lucida (Muhl.) - Shining Willow
Salix pentandra (Linn.) - Laurel or Bayleaf Willow
Salix tristis (Ait.) - Dwarf or Sage Willow
Sambucus canadensis (Linn.) - Sweet Elder
Sambucus nigra (Linn.) - European Elder
Sambucus racemosa (Linn.) - Red-berried Elder
Shepherdia canadensis (Nutt.) - Buffaloberry
Sorbaria sorbifolia (A. Braun.) - Ash-leaved Spirea
Spirea arguta (Zabel.) - Garland Spirea
Spirea bumalda (Burvenich.) - Bumalda Spirea
Spirea prunifolia (Sieb. & Zucc.) - Bridal Wreath, Plumleaf Spirea
Spirea thunbergi (Sieb.) - Thunberg's Spirea
Spirea tomentosa (Linn.) - Hardhack or Steeplebush
Spirea vanhouttei (Zab.) - VanHoutte Spirea
Staphylea trifolia (Linn.) - American Bladdernut
Stephenandra flexuosa (Sieb. & Zucc.) - Cut-leaf Stephenandra. syn. *S. incisa*
Stephenandra incisa (Thunb.) - Cut-leaf Stephenandra. syn. *S. flexuosa*
Symphoricarpus albus (Blake.) - Snowberry. syn. *Symphoricarpus racemosus*
Symphoricarpus orbiculatus (Moench.) - Indian Currant. syn. *S. vulgaris*
Symphoricarpus racemosus (Michx.) - Snowberry. syn. *Symphoricarpus albus*
Symphoricarpus vulgaris (Michx.) - Buckbrush. syn. *Symphoricarpus orbiculatus*

Syringa amurensis (Rupr.) - Amur or Manchurian Lilac
Syringa chinensis (Willd.) - Rouen Lilac
Syringa josikaea (Jacq.) - Hungarian Lilac
Syringa pekinensis (Rupr.) - Peking Lilac
Syringa persica (Linn.) - Persian Lilac
Syringa sweginzowi (Koeh. & Lingelsh.) - Chengtu Lilac
Syringa villosa (Vahl.) - Himalayan Lilac
Syringa vulgaris (Linn.) - Common Lilac
Tamarix gallica (Linn.) - French Tamarisk
Tamarix parviflora (DC.) - Tamarisk
Tamarix pentandra (Pall.) - Five-stamen Tamarisk
Vaccinium angustifolium (Ait.) - Lowbush Blueberry. syn. *Vaccinium pennsylvanicum*
Vaccinium corymbosum (Linn.) - Highbush Huckleberry, Tall Blueberry
Vaccinium pennsylvanicum (Lam.) - Lowbush Blueberry. syn. *V. angustifolium*
Viburnum acerifolium (Linn.) - Dockmackie or Maple-leaved Viburnum
Viburnum americanum (Mill.) - Crampbark or American Highbush Cranberry

BROAD-LEAVED EVERGREENS

Andromeda polifolia (Linn.) - Wild or Bog Rosemary
Arctostaphylos uva-ursi (Spreng.) - Bearberry, Kinnikinnick
Berberis neuberti (Lem.) - Neubert Barberry. syn. *Mahoberberis neuberti*
Berberis mentorensis (Wayside) - Mentor Barberry
Buxus sempervirens (Linn.) - Boxwood
Calluna vulgaris (Hull) - Heather, Ling
Chamaedaphne calyculata (Moench.) - Leatherleaf, Cassandra
Chimaphila umbellata (Nutt.) - Pipsissewa, Prince's Pine
Daphne cneorum (Linn.) - Garland Flower
Epigaea repens (Linn.) - Trailing Arbutus, Mayflower
Erica carnea (Linn.) - Moor Heath
Erica cinerea (Linn.) - Scotch Heath
Erica tetralix (Linn.) - Cross-leaved Heath
Erica vagans (Linn.) - Cornish Heath
Euonymus fortunei (Turcz.) - Wintercreeper. syn. *Euonymus radicans*
Euonymus japonica (Linn.) - Evergreen Burning Bush
Euonymus radicans (Sieb.) - Wintercreeper. syn. *E. fortunei*
Gaultheria procumbens (Linn.) - Checkerberry, Wintergreen
Hedera helix (Linn.) - English Ivy
Ilex aquifolium (Linn.) - European or English Holly
Ilex crenata (Thunb.) - Japanese Holly
Ilex glabra (Gray) - Inkberry
Ilex opaca (Ait.) - American or Christmas Holly
Kalmia angustifolia (Linn.) - Sheep-Laurel, Lambkill
Kalmia latifolia (Linn.) - Mt. Laurel, Calico Bush
Kalmia polifolia (Wangh.) - Pale Laurel
Ledum groenlandicum (Oed.) - Labrador Tea
Leucothoe catesbaei (Gray) - Drooping Leucothoe
Lyonia mariana (Linn.) - Staggerbush. syn. *Pieris mariana*
Mahoberberis neuberti (Baumann) - Neubert Barberry. syn. *Berberis neuberti*
Mahonia aquifolium (Nutt.) - Oregon Grape
Pachistima canbyi (Gray) - Ratstripper
Pachysandra terminalis (Sieb. & Zucc.) - Mt. Spurge
Pieris floribunda (Benth. & Hook) - Fetterbush
Pieris japonica (D. Don) - Japanese Andromeda
Pieris mariana (Benth. & Hook.) - Staggerbush. syn. *Lyonia mariana*
Pyracantha coccinea (Roem.) - Scarlet Firethorn
Rhododendron catawbiense (Michx.) - Rose Bay, Catawba Rhododendron
Rhododendron maximum (Linn.) - Great Laurel, American Rose Bay
Viburnum rhytidophyllum (Hemsl.) - Leatherleaf Viburnum
Vinca minor (Linn.) - Myrtle, Lesser Periwinkle

CONIFERS

Abies balsamea (Mill.) - Balsam Fir, Balm of Gilead
Abies cilicica (Carr.) - Cilician Fir
Abies concolor (Lindl. & Gord.) - White or Silver Fir
Abies Fraseri (Poir.) - Fraser Fir or She Balsam
Abies homolepis (Sieb. & Zucc.) - Nikko Fir. syn. *Abies brachyphylla*
Abies nordmanniana (Spach.) - Nordman or Caucasian Fir
Abies veitchi (Lindl.) - Veitch Fir
Cedrus atlantica (Manetti) - Atlas or Algerian Cedar
Cedrus deodara (Laws.) - Deodar Cedar
Cedrus libani (Laws.) - Cedar of Lebanon
Chamaecyparis lawsoniana (Parl.) - Lawson's Cypress. syn. *Cupressus lawsoniana*
Chamaecyparis nootkatensis (Sudw.) - Nootka Cypress
Chamaecyparis obtusa (Endl.) - Hinoki Cypress
Chamaecyparis pisifera (Endl.) - Sawara Cypress, Retinospora
Chamaecyparis thyoides (Brit.) - White Cedar
Cryptomeria japonica (D. Don.) - Cryptomeria
Cupressus lawsoniana (A. Murr.) - Lawson Cypress. syn. *Chamaecyparis lawsoniana*
Cupressus macrocarpa (Hartw.) - Monterey Cypress

Cupressus sempervirens (Linn.) - Italian Cypress
Juniperus chinensis (Linn.) - Chinese Juniper
Juniperus communis (Linn.) - Common Juniper
Juniperus excelsa (Bieb.) - Greek Juniper
Juniperus horizontalis (Moench.) - Creeping Juniper
Juniperus japonica (Hort.) - Prostrate Juniper. syn. *J.chinensis japonica* (Carr.)
Juniperus sabina (Linn.) - Savin Juniper
Juniperus squamata (Buch.-Ham.) - Creeping Cedar
Juniperus virginiana (Linn.) - Red Cedar
Larix europaea (DC.) - Larch . syn. *Larix decidua* (Mill.)
Larix laricina (K.Koch) - Tamarack, Hackmatack
Picea canadensis (BSP) - White or Canadian Spruce . syn. *P.glauca* (Moench.)
Picea engelmanni (Engelm.) - Engelman Spruce
Picea excelsa (Link.) - Norway Spruce. syn. *Picea abies* (L.)
Picea mariana (BSP.) - Black Spruce
Picea omorika (Bolle) - Serbian Spruce
Picea orientalis (Carr.) - Oriental Spruce
Picea polita (Carr.) - Tigertail Spruce
Picea pungens (Engelm.) - Colorado Spruce
Pinus banksiana (Lamb.) - Jack Pine or Scrub Pine
Pinus bungeana (Zucc.) - Lace-bark Pine
Pinus cembra (Linn.) - Swiss Stone Pine
Pinus flexilis (James) - Limber Pine
Pinus montana (Mill.) - Swiss Mountain Pine
Pinus mugo (Turra.) - Mugho Pine . syn. *Pinus montana mugo*
Pinus nigra (Arnold) - Austrian Pine
Pinus ponderosa (Dougl.) - Western Yellow Pine, Bull Pine
Pinus resinosa (Ait.) - Red Pine, Norway Pine
Pinus rigida (Mill.) - Pitch Pine
Pinus strobus (Linn.) - White or Weymouth Pine
Pinus sylvestris (Linn.) - Scotch Pine
Pinus virginiana (Mill.) - Scrub or Jersey Pine
Pseudotsuga douglasii (Carr.) - Douglas Fir . syn. *P.taxifolia*
Pseudotsuga taxifolia (Poir.) - Douglas Fir . syn. *Pseudotsuga douglasii*
Sciadopitys verticillata (Sieb.& Zucc.) - Umbrella Pine
Taxodium distichum (Rich.) - Bald Cypress
Taxus baccata (Linn.) - English Yew
Taxus canadensis (Marsh.) - - American Yew
Taxus cuspidata (Sieb.& Zucc.) - Japanese Yew
Thuja koraiensis (Nakai) Korean Arborvitae
Thuja occidentalis (Linn.) - Arborvitae or White Cedar
Thuja orientalis (Linn.) - Oriental Arborvitae . syn. *Biota*
Thuja plicata (Don.) - Giant Arborvitae
Tsuga canadensis (Carr.) - Hemlock
Tsuga carolinian (Engelm.) - Carolina Hemlock

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